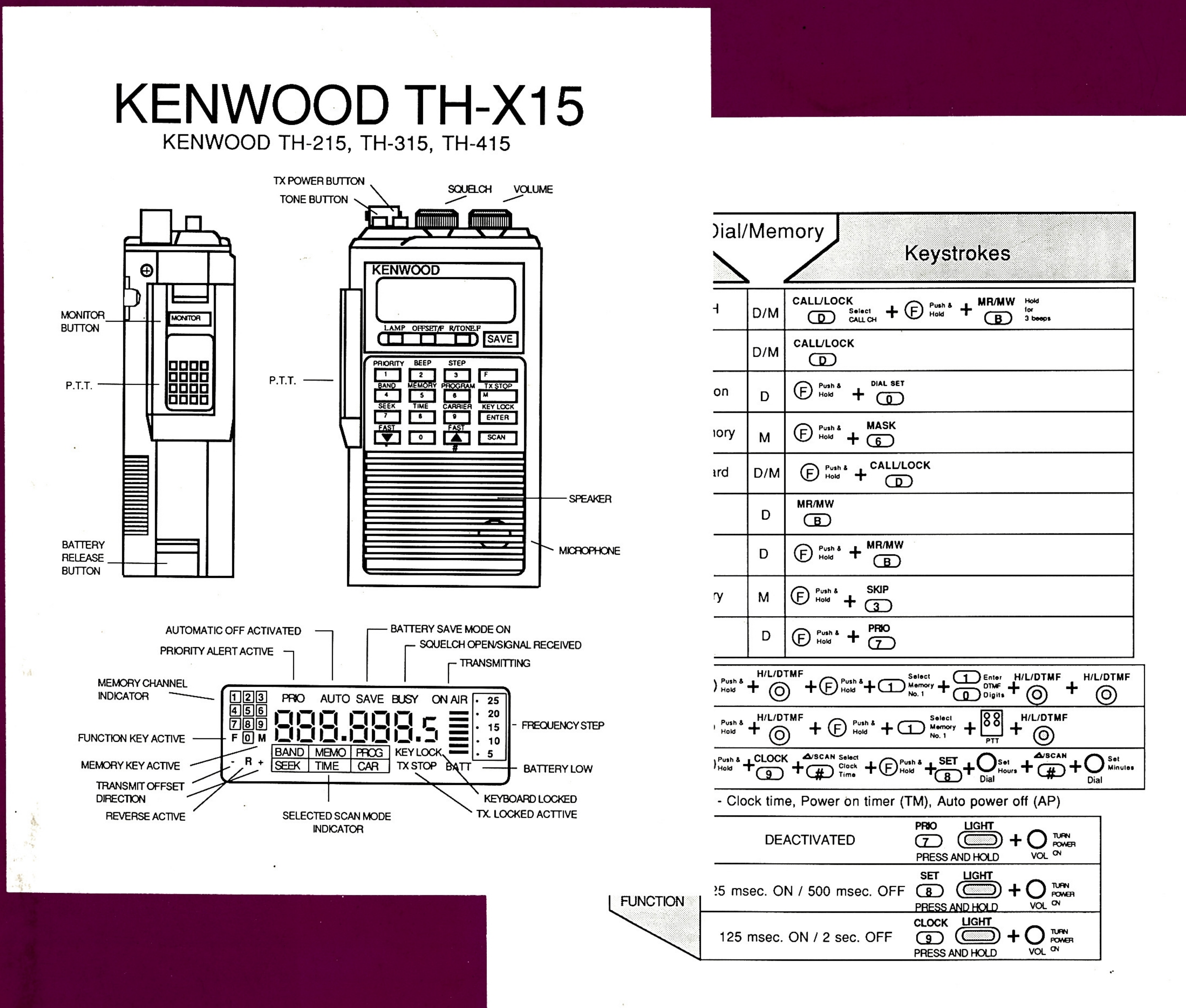
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Lost User Manuals

By

Bill Smith, N6MQS

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Lost User Manuals

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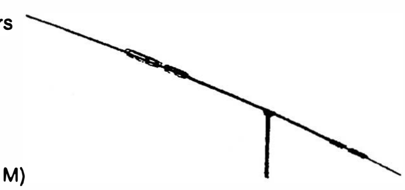
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Preface

Some of you are old hand at using Hi-Tech electronic radios; some of you are new to the experience. Some of you may understand alternate keyboard functions and some of you are still getting used to the idea of the volume control and the on switch being located on the same button.

The one thing you have in common is that you all are using a new radio and need to learn to access all the advanced features.

There are three basic barriers to learning anything. The first is thinking you already know it (a sort of "why bother" attitude). The second is deciding you can't learn it. And the third is going past words in your reading that you don't understand.

Perhaps we've helped those of you who think you already know it by just pointing this out. After all, if you have not memorized the operating manual for the radio you are using, no matter how much you know about other radios, there's probably still something to learn about operating it.

As far as the second barrier goes, no one can guarantee that you can learn it. But, starting off thinking you can't makes it a lot more difficult. In a sense, thinking makes it so. So try to adopt an attitude that it's at least possible for you to learn it. Things will go much more smoothly.

Handling the third is a mutual responsibility. You have to make sure you understand the terms, and we have attempted to provide a decent explanation in the following pages. This way you don't have to go hunting around the manual to try to figure out terms before you can proceed.

This manual is a kind of quick reference guide for operating an electronic radio. We have attempted to explain the functions of each key, the meaning of display symbols and prompts. Included on these instructions are key by key instructions for performing most of the "basic" procedures.

We have made every effort to verify each section by working with the specific radio. However, some radios were not at our disposal. All the original manuals were used as reference guides so we expect you will have no problem operating your radio.

We wish to thank all the helpful people at ICOM, Yaesu, and Alinco for there support in the making of this book. Also special thanks to the individuals who provided us with their personal manuals. The spirit of amateur radio is alive and well.

If you do have a problem using your radio, let us know where you are having a problem. We will make every effort to explain the feature or function better in our next version of this manual. A suggestion form is included in the back of this book. If your suggestion is original and we elect to use it, we will send you a copy of the new version as soon as it becomes available.

We expect to update this book at least once a year. We will add in new radios and make corrections and improvements to the current documentation.

Good luck and have some fun operating your new radio.

Glossary

A.B.C. - Automatic Band Control. This feature will automatically switch the active band (the one with receive activity) to the main band position. This feature is present on dual band radios.

ALC - Automatic Limiting Control. This feature will automatic limit (reduce) the output power of a transmitter. This feature will protect the transmitter in the event of high SWR.

Alternate key command - This refers to the secondary function of a key. The alternate of secondary function is selected by first pressing (and sometimes holding) a [FUNCTION] key.

Band - This refers to a group of frequencies. Many of the "DUAL BAND" radios can operate on two or more bands. The 2 meter band is the group of frequencies between 144 MHz and 148 MHz. The 440 Band contains the frequencies between 440 MHz and 450 MHz.

Bank - Some radios store memories into memory banks. A 100 memory radio may have the memories grouped into 10 banks with 10 memories in each bank. Memory banks can be useful to help group "classes" of frequencies. Fire, Police frequencies are often grouped into separate banks.

BEEP - This refers to an audible sound that occurs signaling an specific event. ie. Keyboard key pressed, Signal received or other event.

Bell - A bell symbol is often used on an L.C.D. display to show that the "BELL ALERT" function is active. In Bell Alert mode, the speaker is turned off and a audible bell sound will signal the reception of a signal.

Burst - Tone "BURST" is a signalling mode used in Europe in place of the PL (subaudible tone) we use in America. In tone burst mode, a tone or group of tones is transmitted each time the P.T.T. key is pressed. The receiving radio will only turn on the speaker when the proper "Tone Burst" is received.

Busy - When a signal is present on a frequency, the channel is "BUSY". The "BUSY" light will light when a signal is present or when the squelch is set to low to block out the background noise on a frequency.

Call Channel- This is a specific memory channel used to store your favorite frequency. It is often selected with a single key.

Carrier - A signal on a frequency. In the scan mode, carrier scan will stop the scan whenever a signal is present.

Check - This is the same feature as "REVERSE". Refer to Duplex or repeater operation. It is often desirable to "CHECK" the repeater input frequency. The [CHECK] key will, while pressed, will monitor the input.

Clock - Many of the new radios have a clock feature. The presence of a clock will also provide automatic power off and power saver functions.

CTCSS - Continuous Tone-Coded Squelch System. Also the same as PL (private line) or DECODE. CTCSS refers to a mode where the speaker is muted unless a specific PL tone is present on the received frequency. A radio can be set in three CTCSS modes: 1) Not using any form of CTCSS. 2) PL Encode only mode. This places a subaudible tone on the transmitted signal only. 3) CTCSS Decode mode. The PL is encoded on the transmitted signal and the speaker is muted unless the received signal has the proper tone.

Decode - See CTCSS. This is a term also used to describe DTMF and Tone Burst signaling features.

Decoder - The electronic component used to find a PL, DTMF or Tone Bursts. A decoder is often an optional accessory.

Digital Squelch - Digital Squelch operates in the same faction as CTCSS. The squelch will remain closed until the specific digital (often DTMF) tones are received. A digital Squelch is usually an optional accessory for a radio.

Dim - A button used to lower the illumination of the display screen.

DTMF - Dual Tone Multi Frequency. A DTMF keypad is a standard accessory on most modern radios. When a DTMF key is pressed along with the P.T.T. key, a two tone sound is transmitted. A receiver with a DTMF decoder can convert the tones back into an electronic command.

Dual - Two. Some radios can operate on two different bands. It is called a dual band radio. Some radios have two VFO modes. It is called dual VFO's.

Duplex - Transmission and reception on different frequencies. Repeater operation requires simultaneous reception and transmission. When a radio is in duplex mode, reception is on the displayed frequency and transmission is offset from the receive frequency by a predetermined amount and direction. On 2 meters the offset is set at 600 kHz. The direction of the offset (up or down) is determined by local practice.

Encoder - To encode a tone (subaudible) on the transmitted signal. Often called to as PL. See CTCSS.

Function - The objective of the key, lever or switch. The [FUNCTION] key is often pressed to select an alternate key command.

Hertz - Cycle per second. Hz

Hide - Hiding a memory may prevent it from being used in normal operation. This feature will allow you to skip unused memories during scanning and operation.

KiloHertz - 1000 cycles per second kHz

LCD Display - Liquid Crystal Display. This type of display requires external lighting to see properly. LCD display consumes very little power and are present on most modern radios.

Limit - See Programmable Scan. Certain scan modes will allow you to select a frequency range to scan. The lowest frequency is called the lower limit and the highest frequency is called the upper limit. These limits are often stored in two specific memory locations.

Lockout - A memory may be locked out from the memory scan mode. You may wish to lockout a memory if it contains a busy repeater.

Megahertz - 1 million cycles per second. MHz

Memory- A memory can store a frequency, offset direction, PL tone and other related items. Most modern radios have at least 10 memories. The desired frequency, etc is set up in the VFO mode and is then transfered to a memory with a set of keyboard commands.

Mute - To silent a speaker. A mute key is pressed to silence the speaker.

Odd-Split - see duplex and offset. It is sometimes useful to change the value of the offset in Duplex mode. Storing an Odd-Split repeater means to store in a memory channel a separate receive and transmit frequency. Some radios allow you to enter the receive and transmit frequencies directly into a memory channel. Other radios require you to enter the receive frequency and the the value of the offset.

Offset - The value of the difference between the receive and the transmit frequency in the Duplex mode. On 2 meters the offset is 600 kHz. The direction of the offset (Up or down) is set by local convention. On the frequency 147.00MHz. A positive (+) offset will transmit on 147.600 MHz. A down (-) offset will transmit on 146.400MHz.

PL - (Private line) Sub-audible tone. A PL tone is encoded on a transmission. A PL decoder (CTCSS) can identify the PL tone and act accordingly. The are 38 suggested PL tones.

Power saver- Many of the newer radios have a feature called Power saver. This feature will conserve power by entering a limited "off" mode for a short duration and then quickly turn on for a few seconds to check for channel activity. If no activity is found, the cycle starts over. The period of "off" time conserves a great amount of power. This assumes that the channel be monitored is not constantly busy.

Priority- Many radios have a Priority memory channel and a priority watch feature. When the priority watch mode is active, the radio will regularly jump to the Priority memory channel to check for activity. If no activity is found, the radio will return to the last frequency.

Programmable band scan- Certain scan modes will allow you to select a frequency range to scan. The lowest frequency is called the lower limit and the highest frequency is called the upper limit. These limits are often stored in two specific memory locations.

PTT - Push To Talk. This is the key used to cause the radio to transmit.

Reset - To restart with the default features, functions and data. Most modern radios utilize a microprocessor. Resetting the microprocessor will often clear all memory and VFO data.

Reverse - see Offset, Duplex and Check. The Reverse key will cause the Transmit and receive frequencies to be exchanged. The radio will the receive on the repeater input and transmit on the repeater output.

RF - Radio Frequency

RIT - The control that shifts the receiver up or down in frequency to improve the reception. Most often used in 1.2 GHz equipment.

Save - see Power Save

Scan Time operated, Carrier operated- See Programmable band scan. Scanning a frequency range of a memory bank can be performed in a number of ways. You may wish to scan and stop on a busy frequency for a time period and then continue scanning (Time operated), or until the signal on the frequency stops (Carrier operated).

Search, Busy, Clear -See Programmable band scan, Scan Time operated Scanning a frequency range of a memory bank can be performed in a number of ways. You may will to scan for a Busy channel or for a clear channel.

Shift - see Duplex, Offset.

Signal Strength - The relative amount of RF signal received by the radio antenna. Signal strength is measured in "S" units

Simplex - see Duplex. When operating in the Simplex mode, The radio will receive and transmit on the same frequency.

Squelch - The control on a receiver that automatically quiets a receiver by reducing its gain.

Step - The amount of increase in frequency when a radio's tuning dial is increased or decreased. Common steps are 5, 10, 12.5, 15,20 and 25 Khz. Most modern radios allow you to change the amount of the frequency step.

Sub - see Band, Dual. On a dual band radio, one band is selected as the main band and the other is then called the Sub-Band.

S.W.R. - Standing wave ratio. see A.L.C. When a transmitter is connected to an antenna, it is hoped that all the RF signal will be radiated from the antenna. In practice, some of the RF energy is reflected back to the transmitter. Reflected energy can damage the transmitter components. The radio of the forward power and reflected power is the S.W.R. value.

Subaudible tone - see P.L., Encoder, Decoder, CTCSS. Subaudible means that it is a tone frequency to low to be heard by the human ear. The tone is often transmitted on a radio frequency along with voice information.

Toggle - A Flip-Flop. To change states or functions alternately. Press to turn on press again to turn off is an example of a toggle switch.

Tone alert - see Beep. When a radio is placed in Tone Alert mode. A beeping will sound when a signal is present on a frequency. This feature may be used along with CTCSS.

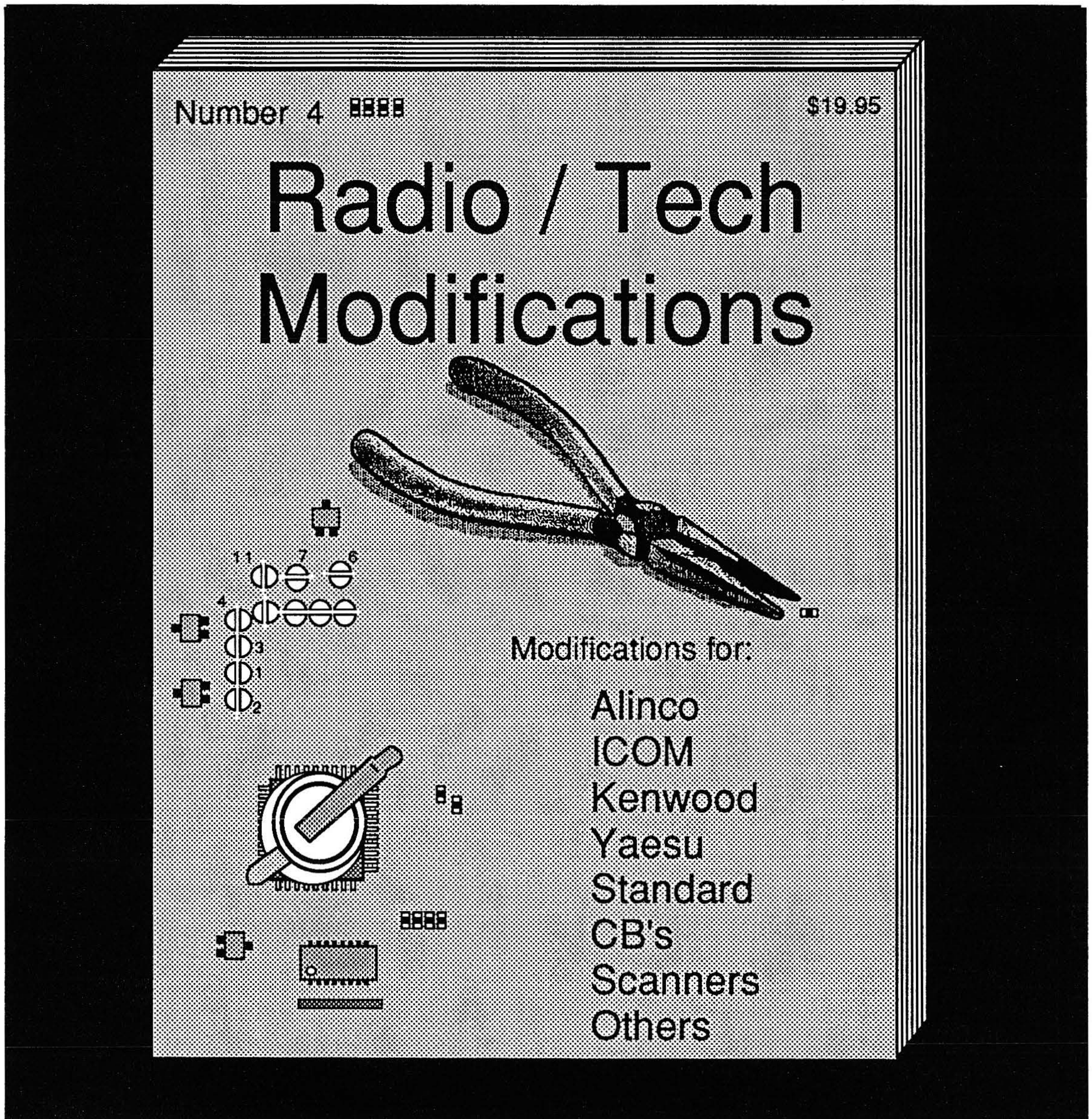
Tone squelch - see CTCSS, PL, Decoder. When a radio is placed in Tone Squelch mode, the speaker will only sound when a signal is present and that signal contains the proper PL tone.

Thumb Wheel - Some radios make use of Thumb wheel controls to select the desired frequency. Each wheel has 10 positions numbered 0 - 9.

Tuning Step - see Step

Unlock - Unlock has two different meanings.
1) To unlock the keyboard and allow keyboard functions. It is often desirable to lock a keyboard to prevent accidental changes. The Lock/Unlock feature is often a toggle feature selected by one key.
2) When the tuning circuits can not turn the selected frequency. A "U" symbol will often appear on the L.C.D. display to show that the radio can not accept the selected frequency.

VFO - Variable Frequency Oscillator. In the VFO mode, frequency, step, shift and all other changes are allowed. Once a frequency and related options are entered in the VFO, the VFO can be copied into a memory location.



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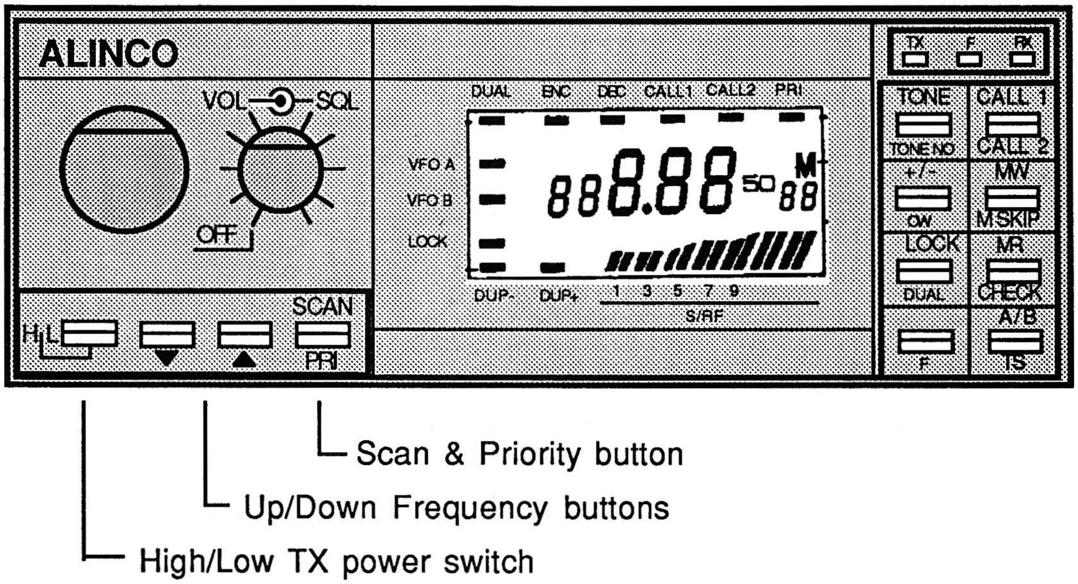
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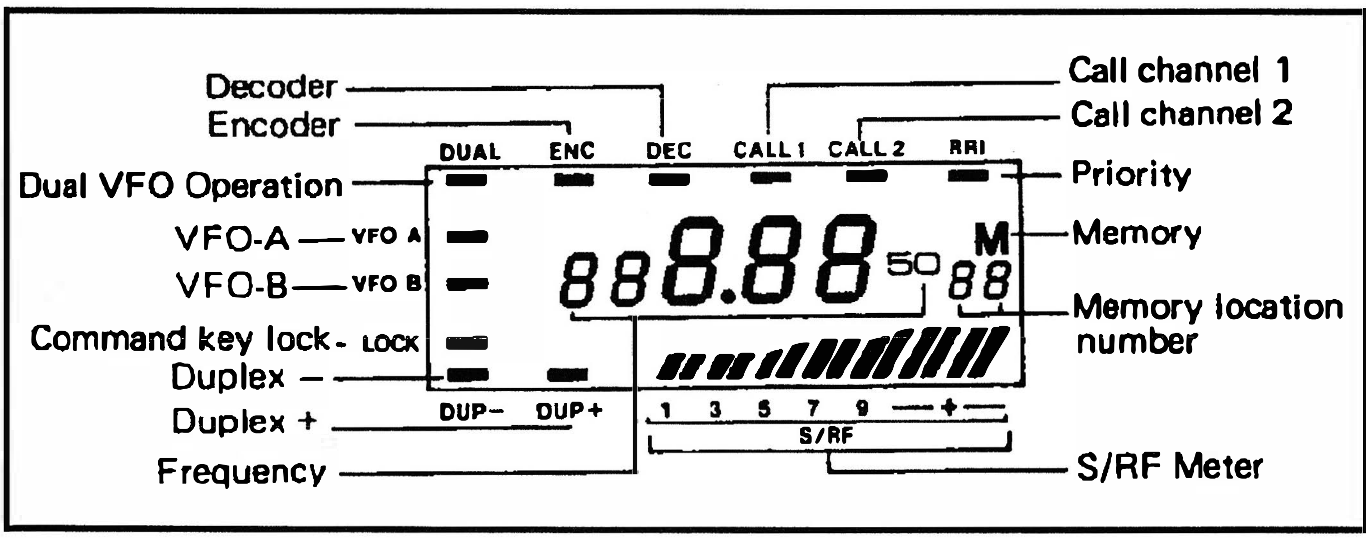
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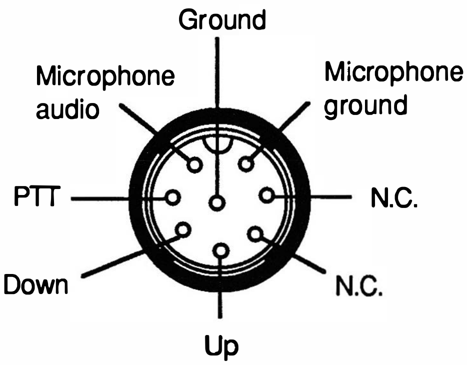
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MEMORY #	FREQUENCY	OFFSET	PL TONE	OTHER
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ALINCO ALD-24T







	Amps Low/High	Power High/Low	Audio Output	Sensitivity
VHF	2.5 / 5	25 / 5	2 W	>.16uV
UHF	2.5 / 5	25 / 5	2 W	>.16uV

Alinco ALR-24T

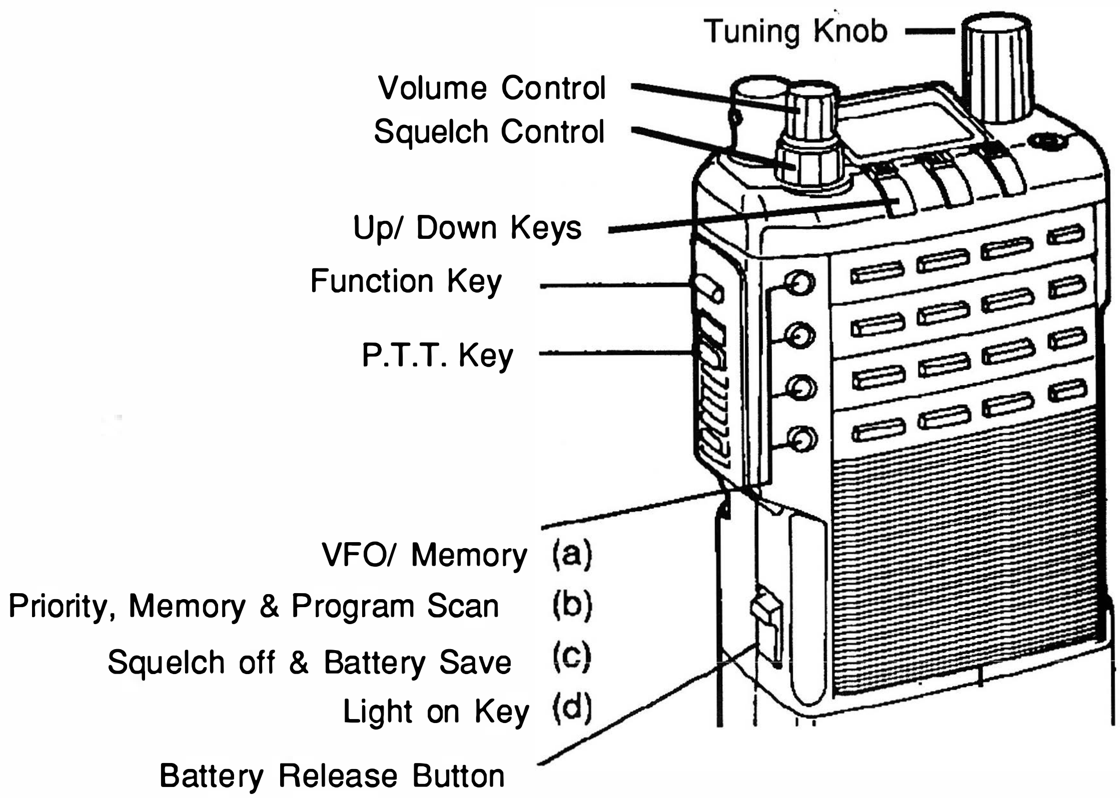
Key	Function	F + Key
F	Press to Select the alternate Key commands	
TONE / TONE NO	Press to Encode, Decode a CTCSS PL tone. Press again to turn the PL off.	Press to select the PL tone. Use the tuning knob to select the PL tone number.
+/- / CW	Press to select the transmit offset direction. +, - and simplex are available	Press to select an"odd split" offset. VFO B can also be used in the Duplex mode.
LOCK / DUAL	Press to Lock / Unlock the keyboard.	Press to select "odd split" or "cross band" operating mode. Use VFO A & VFO B
CALL 1 / CALL 2	Jump to Memory channel # 1	Jump to Memory channel # 2
MW / M SKIP	Press to store current VFO into a memory channel.	Press to set a memory to be skipped during memory scan.
MR / CHECK	Press to enter the memory channel mode	Press to check the duplex input for a signal.
A/B / TS	Press to enter VFO A or VFO B.	Press to select the tuning step of the main tuning knob.

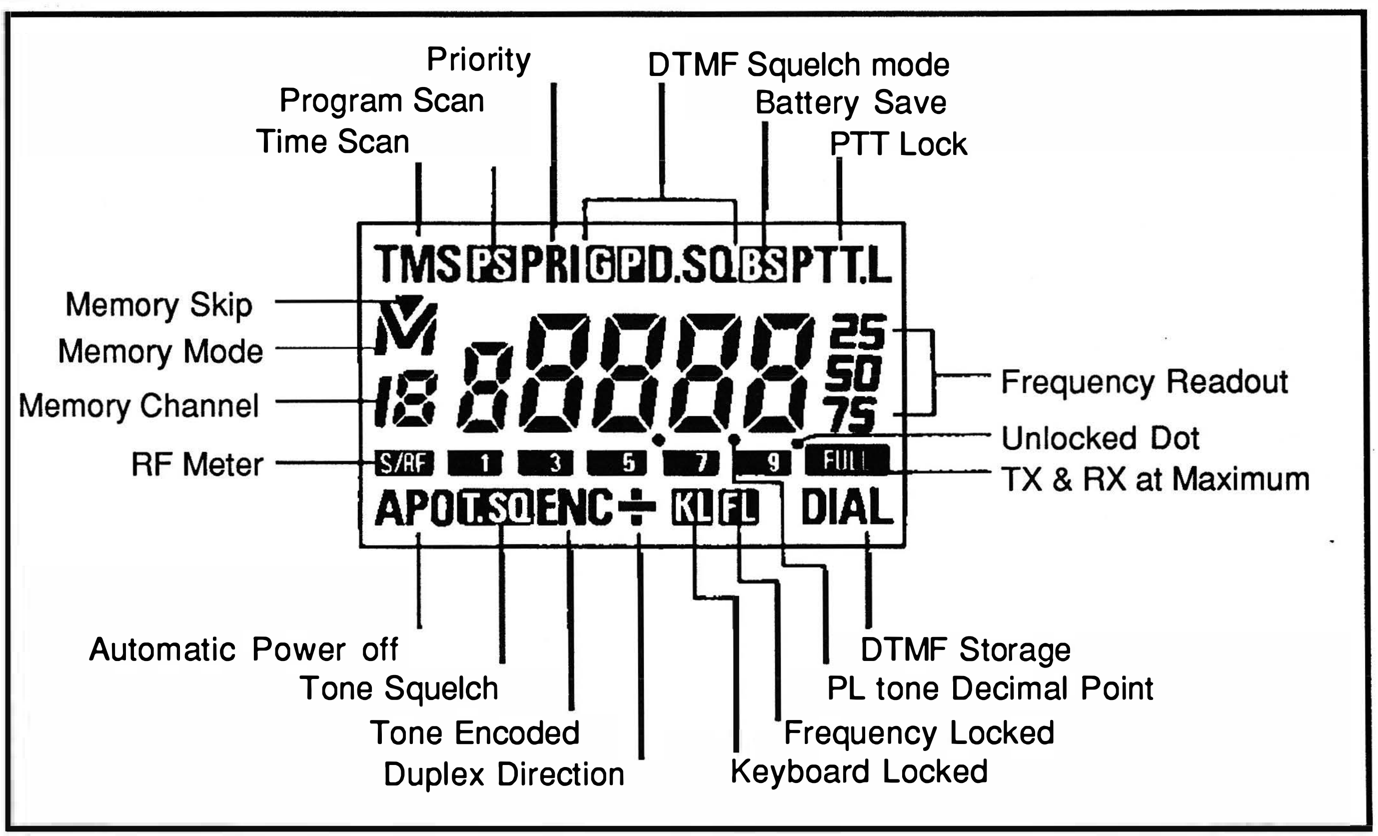
Desired Function	Mode	Keystrokes
Store a Memory	D	MW/M SKIP + ▼ ▲ Select Memory Channel + MW/M SKIP
CALL Channel Recall	D/M	CALL 1/CALL 2
Channel Step Selection	D	F + A/B/TS + Dial + A/B/TS
Set a PL tone	D	F + TONE/TONE NO + Dial + TONE/TONE NO
Lock/Unlock Keyboard	D/M	F + LOCK/DUAL

TONE No.	Frequency in Hz	TONE No.	Frequency in Hz	TONE No.	Frequency in Hz	TONE No.	Frequency in Hz
00	no tone	10	94.8	20	136.5	30	192.8
01	67.0	11	100.0	21	141.3	31	203.5
02	71.9	12	103.5	22	146.2	32	210.7
03	74.4	13	107.2	23	151.4	33	218.1
04	77.0	14	110.9	24	156.7	34	225.7
05	79.7	15	114.8	25	162.3	35	233.6
06	82.5	16	118.8	26	167.9	36	241.8
07	85.4	17	123.0	27	173.8	37	250.3
08	88.5	18	127.3	28	179.9		
09	91.5	19	131.8	29	186.2		

Alinco DJ-X60T

DJ-160T & DJ-460T





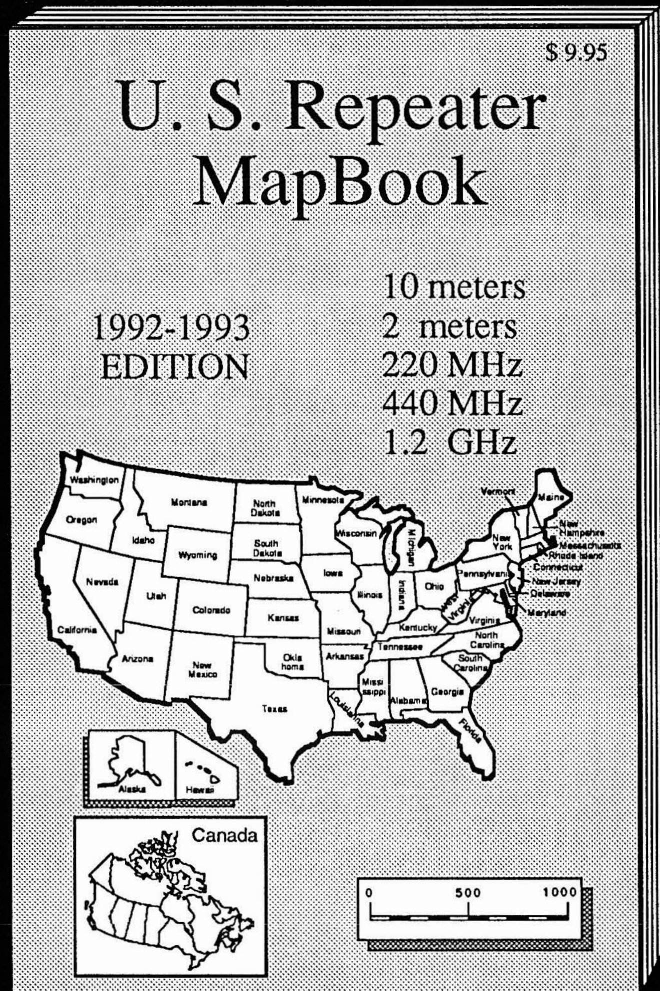
1 [ ] + / -	Select the Transmitter offset direction
2 [ ] OFFSET	Select the desired offset amount.
3 [ ] REV	Reverse the Transmit and Receive frequencies
4 [ ] MW	Write current VFO frequency into a Memory Channel
5 [ ] M.SKIP	Skip selected Memory Channel during memory scan
6 [ ] STEP	Select the desired Frequenct Step 5 KHz, 10 kHz, 12.5 KHz, 20 kHz or 25 kHz
7 [ ] BEEP	Press to turn the keyboard beep sound on/off.
8 [ ] TMS	Select Time Scan mode (TMS will appear), press again to select Busy Scan
9 [ ] APO	Press to activate/deactivate the power off mode. After 30 minutes of no reception, the radio will enter the battery saving off mode.
CALL [ ] A DIAL M	Press to select the CALL Channel Press while holding [FUNCTION] to
[ ] B K.L. F.L.	Press to Lock/Unlock the Keyboard.
[ ] C PTT.L	Press to Lock/Unlock the Push to Talk key. (PTT will appear)
DIAL CH [ ] D ENC/TSQ	Press to select the desired Dial Channel. 1,2, or 3. Press to select the desired PL Encode/Decode mode.
▼ * [ ] DSQ SET	Press to enter the desired Digital Squelch (DTMF) codes. Enter 5 digits and then press the [V/M] key.
0 [ ] GP DSQ	Press to select the desired Digital Squelch mode. Code, Group, Individual or Cancel.
▲ # [ ] TSQ SET	Press to select the desired PL Encode/Decode frequency. Rotate dial to select the desired frequency.

Desired Function	Keystrokes
DTMF DECODE DISPLAY	DIAL CH [ ] Select Dial No. 3 + [ ] DSQ SET Select DSQ on the Display All DTMF tones received on the selected frequency will be displayed on the LCD Display.
DUAL WATCH Function	Select a Memory or VFO + CALL [ ] A DIAL M Select the Call Channel + Hold Function & press PRI Key
Lamp Lock on Function	Press and hold the FUNCTION Key + Press Lamp Key · Press LAMP Key again to Cancel

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EME-4	Earphone/Mocrophone
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EJ-6U	Tone Squelch unit

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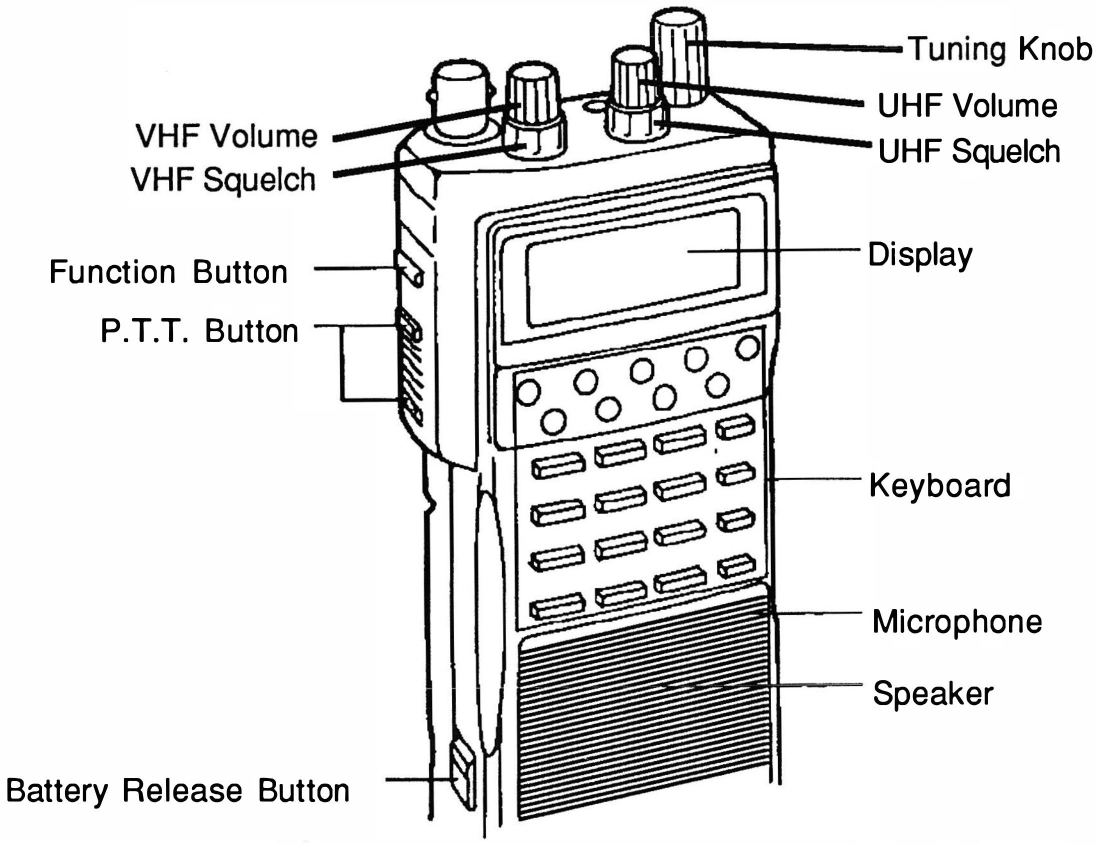
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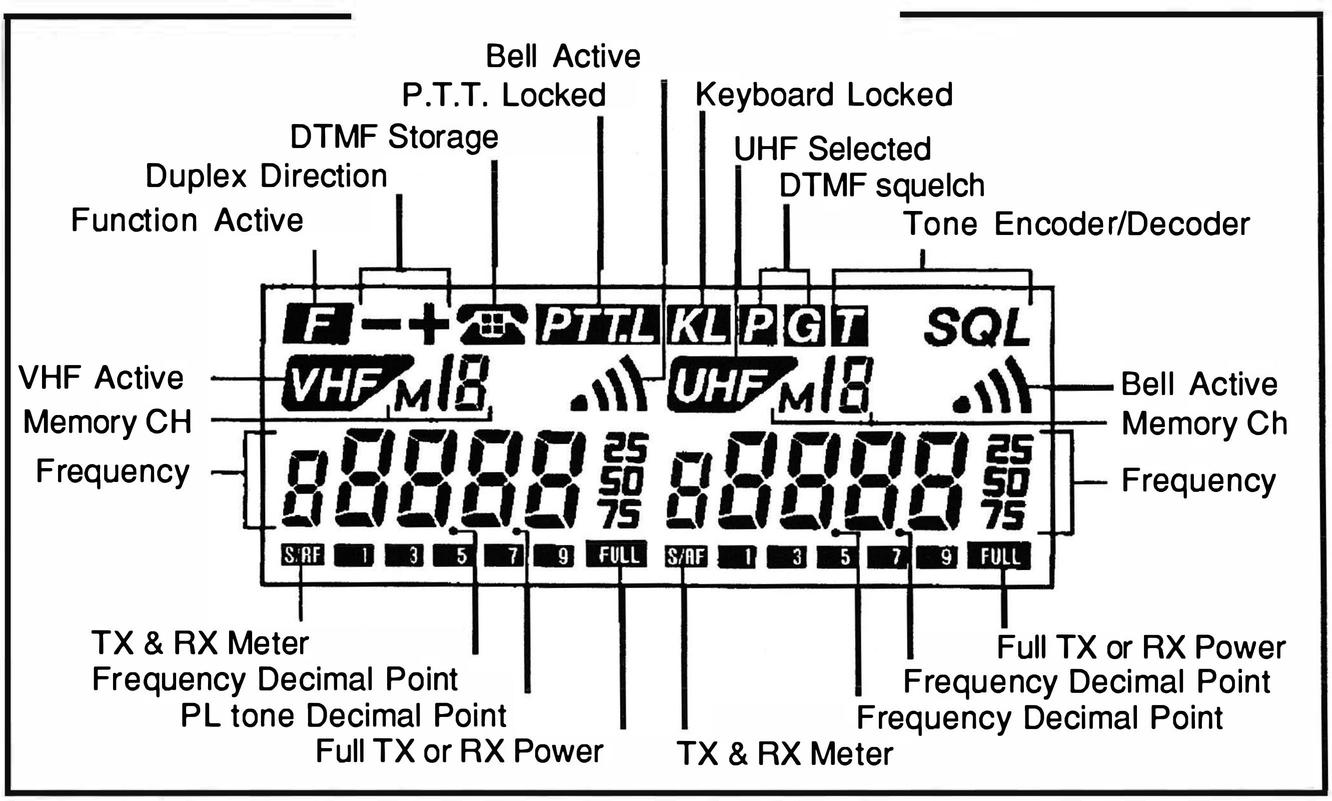
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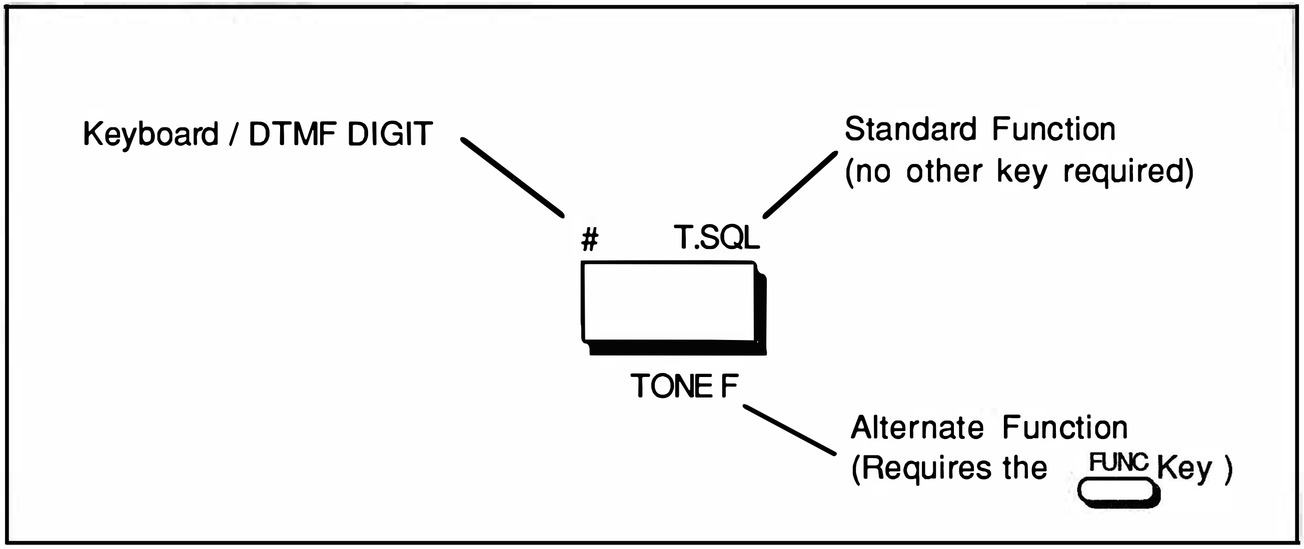
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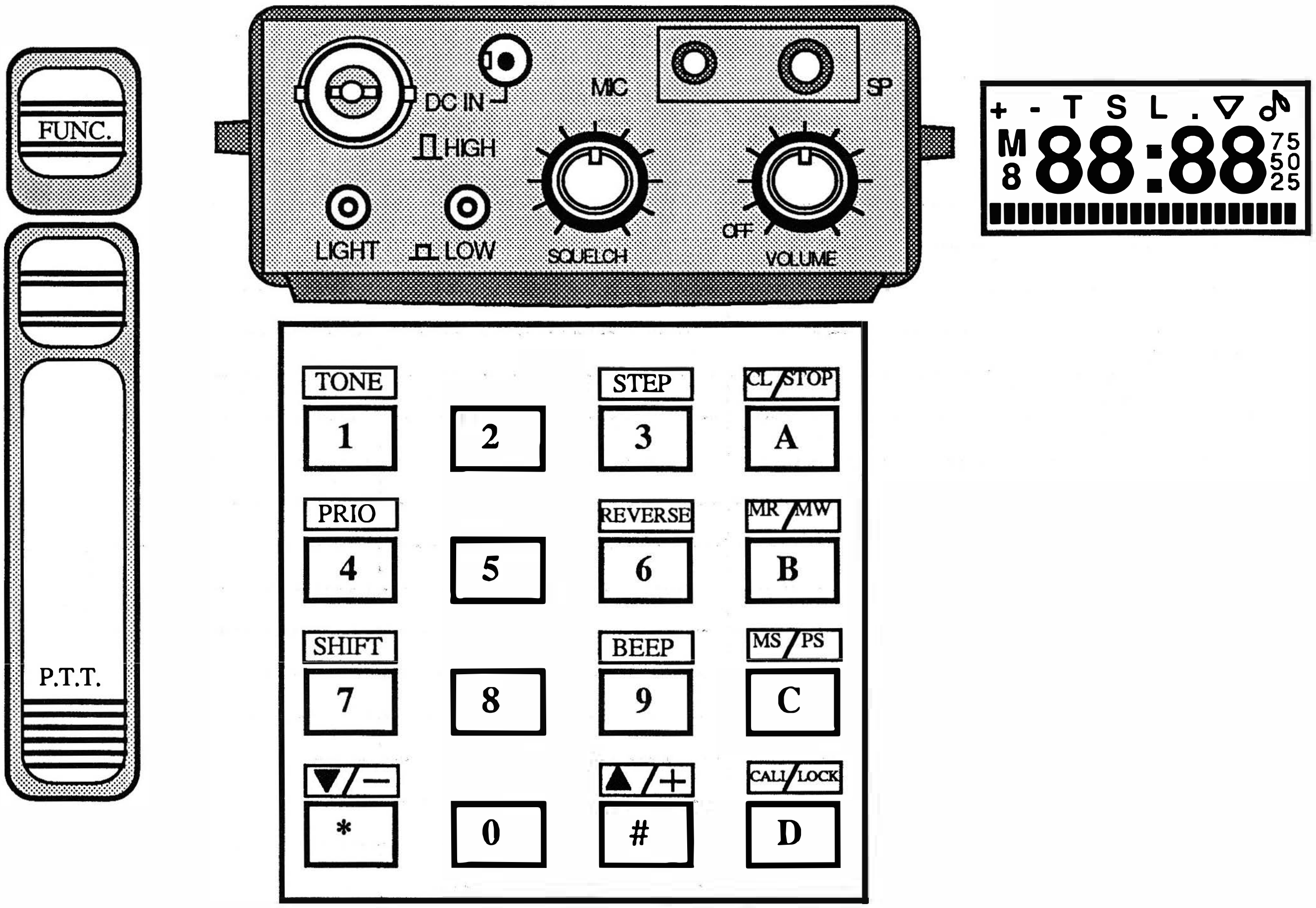


Desired Function	Mode	Keystrokes
Store a Memory	D	Select a Memory CH + Enter a Frequency + FUNC Press and hold + 4 MW
Enter a CALL Ch. Freq.	D/M	Enter Frequency + FUNC Hold until F appears + D [CALL] CALL W
Skipping a Memory (during scanning)	M	Select a Memory CH + FUNC Press and hold + 5 M SKIP
Set a PL tone	D	FUNC Press and hold + # T SQL TONE F + Dial + SELECT TONE + VHF
Lock/Unlock Keyboard	D/M	FUNC Press and hold + 8 KL FL CYCLES: KEYLOCK, FREQ. LOCK, OFF
Scanning Modes	D	FUNC Press and hold + 8 TMS VCS r-SC Timed Scan u-CS Empty Scan b-SC Busy Scan
Program Scan	M	Store Lower Limit in Memory 18 + Store Upper Limit in Memory 19 + FUNC Press and hold + PRI PS
Automatic Dialer	D/M	FUNC Press and hold + A DIAL M + Enter up to 16 Digits + VHF
Transmit Auto. Dialer	D/M	88 PTT Press and hold + FUNC

MEMORY #	FREQUENCY	OFFSET	PL TONE	OTHER
1				
2				
3				
4				
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6				
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ICOM -0X A/AT

ICOM IC-02, IC-03, IC-04



	Key Press Functions
TONE 1	Press with the [FUNCTION] Key. This key will set a desired PL Subaudible tone. Tone numbers from 00 - 55 are available.entering 00 selects no tone. The "T" symbol will appear on the display during transmit when a valid tone is selected
STEP 3	Press with the [FUNCTION] Key. This key will select a desired frequency step. Steps are selected by then pressing the 1 - 5 key. 1 = 5 KHz, 2 = 10 KHz, 3 = 15 KHz, 4 = 20 KHz, 5 = 25 KHz
PRIO 4	Press with the [FUNCTION] Key. This key sets the Priority function. Memory 1 is the priority channel. Clear the function with the [A] key.
REVERSE 6	Press with the [FUNCTION] Key. This key will, when you are operating in the duplex mode, reverse the transmit and receive frequency. This function allows you to monitor the repeater input while transmitting on the repeater output.

Key Press Functions

Key	Function
SHIFT / 7	Press with the [FUNCTION] Key. This Key will set the desired offset transmit direction. Press the [*] key for a minus or down offset, or the [#] key for a positive or up offset. Then enter the desired frequency offset. The Offset is a four digit number. 2 meters use 0600, 220 MHz use 1600, or on 440 MHz use 5000. The Display will show the direction of the offset.
BEEP / 9	Press with the [FUNCTION] Key. THis key turns on and off the BEEP sound that occurs when you press a key. The display will show a little music symbol when the Beep function is on.
▼/− / *	Press alone to decrease the operating frequency when in the VFO/DIAL mode. In the Memory mode this key will decrease the memory channel number. This key when pressed after the [SHIFT] key will select the minus offset.
▲/+ / #	Press alone to increase the operating frequency when in the VFO/DIAL mode. In the Memory mode this key will increase the memory channel number. This key when pressed after the [SHIFT] key will select the positive offset.
CL/STOP / A	Press alone. This key will clear any entered number and recall any previous frequency or will clear to "00". This key will also clear the Memory channel mode and enter VFO/Dial mode. This key is also used to stop the scan mode.
MR/MW / B	Press alone. This Key will set the radio in the memory recall mode. Then press the 0 - 9 key to select a memory channel. Press with the [FUNCTION] Key. This Key will write the frequency in the VFO/DIAL mode into a memory channel. Then Press the memory channel number 0 - 9 to store the frequency in. The display will show a large "M" when in the memory mode.
MS/PS / C	Press alone to select the memory scan mode. All memories will be scanned. Press with the [FUNCTION] Key to select the Frequency scan mode. Store the Lower frequency in memory channel 0 and the upper frequency limit in memory 1.
CALL/LOCK / D	Press alone to select memory channel 1. All other keys, except the [A] key, will be ignored. Press with the [FUNCTION] Key to lock and unlock the keyboard.

Special Memory Channel Assignments

Memories 9 & 0 hold the high and low limits for programmed scan.

Memories 2 - 6 will have the same offset and PL tone as memory 1.

Memories 7 - 0 may all hold different offsets and PL tones.

Odd-split repeaters

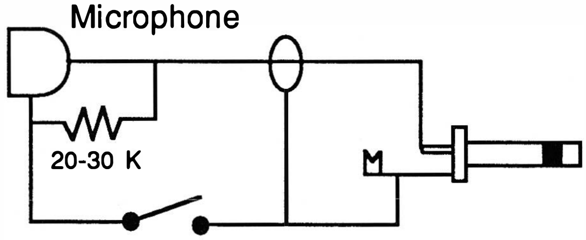
Change to offset using the [Shift] key. Then store the frequency, offset & PL into a memory CH (7 - 0).

SPECIFICATIONS

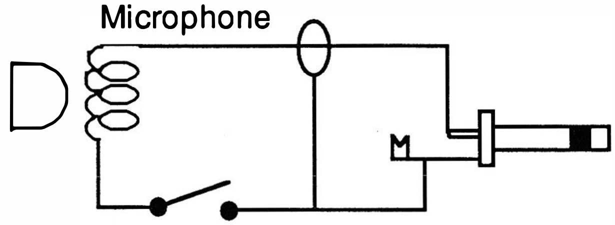
	IC-02	IC-03	IC-04
Frequency Range	144 - 148 MHz	220 - 224 MHz	440 - 450 MHz
TX Power / Volts.	5 W @ 13.2V 3 W @ 8.4V .5 W @ 8.4V	5 W @ 13.2V 3 W @ 8.4V .5 W @ 8.4V	5 W @ 13.2V 3 W @ 8.4V .5 W @ 8.4V
Current Drain Squelched Max Audio TX .5 watts TX 3 watts	 35mA 140mA .45 Amps 1.05 Amps		

Microphone Schematics

Electret Condenser Microphone



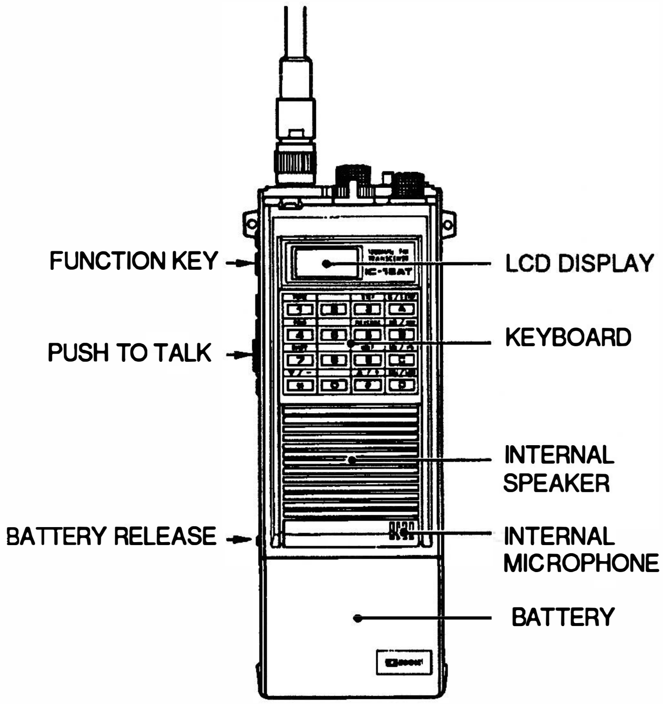
Dynamic Microphone

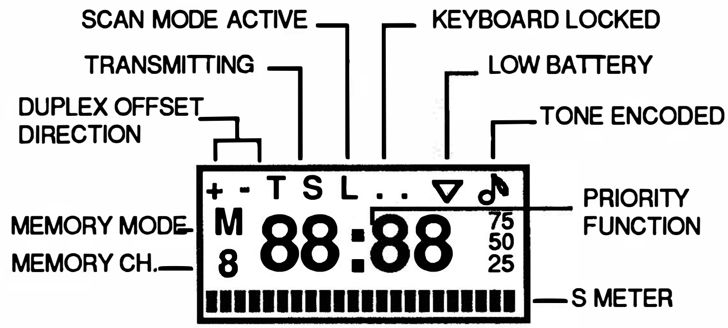


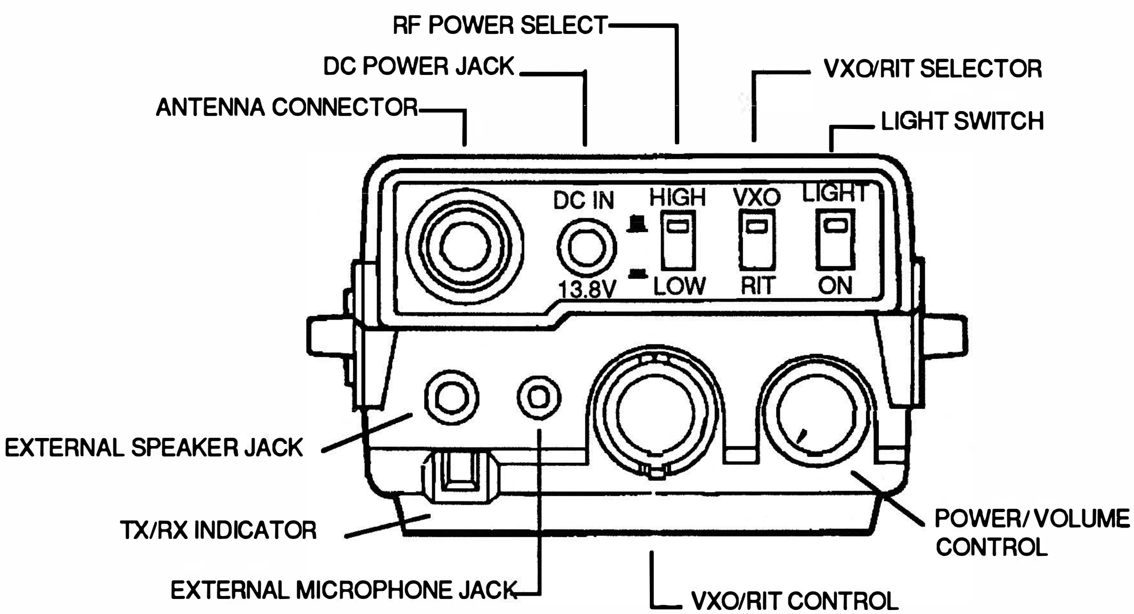
TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz
00	no tone	15	110.9	30	186.2	45	1600.0
01	67.0	16	114.8	31	192.8	46	1700.0
02	71.9	17	118.8	32	203.5	47	1750.0
03	74.4	18	123.0	33	210.7	48	1800.0
04	77.0	19	127.3	34	218.1	49	1900.0
05	79.7	20	131.8	35	225.7	50	2000.0
06	82.5	21	136.5	36	233.6	51	2200.0
07	85.4	22	141.3	37	241.8	52	2975.0
08	88.5	23	146.2	38	250.3	53	2550.0
09	91.5	24	151.4	39	500.0	54	2295.0
10	94.8	25	156.7	40	600.0	55	2125.0
11	97.4	26	162.3	41	700.0		
12	100.0	27	167.9	42	800.0		
13	103.5	28	173.8	43	900.0		
14	107.2	29	179.9	44	1000.0		

Notes

ICOM -12AT


FUNCTION KEY
PUSH TO TALK
BATTERY RELEASE
LCD DISPLAY
KEYBOARD
INTERNAL SPEAKER
INTERNAL MICROPHONE
BATTERY


SCAN MODE ACTIVE
KEYBOARD LOCKED
TRANSMITTING
LOW BATTERY
DUPLEX OFFSET DIRECTION
TONE ENCODED
PRIORITY FUNCTION
MEMORY MODE
MEMORY CH.
S METER
+ - T S L . .
M
8
88:88
75
50
25


RF POWER SELECT
DC POWER JACK
ANTENNA CONNECTOR
VXO/RIT SELECTOR
LIGHT SWITCH
DC IN
13.8V
HIGH
LOW
VXO
RIT
LIGHT
ON
EXTERNAL SPEAKER JACK
TX/RX INDICATOR
EXTERNAL MICROPHONE JACK
POWER/VOLUME CONTROL
VXO/RIT CONTROL

Key	FUNCTION IC-12AT
TONE 1	Press with the [FUNCTION] Key. This key will set a desired PL Subaudible tone. Tone numbers from 00 - 55 are available.entering 00 selects no tone. The "T" symbol will appear on the display during transmit when a valid tone is selected
STEP 3	Press with the [FUNCTION] Key. This key will select a desired frequency step. Steps are selected by then pressing the 1 - 5 key. 1 = 5 KHz, 2 = 10 KHz, 3 = 15 KHz, 4 = 20 KHz, 5 = 25 KHz
PRIO 4	Press with the [FUNCTION] Key. This key sets the Priority function. Memory 4 is the priority channel. Clear the function with the [A] key.
REVERSE 6	Press with the [FUNCTION] Key. This key will, when you are operating in the duplex mode, reverse the transmit and receive frequency. This function allows you to monitor the repeater input while transmitting on the repeater output.
SHIFT 7	Press with the [FUNCTION] Key. This Key will set the desired offset transmit direction. Press the [*] key for a minus or down offset, or the [#] key for a positive or up offset. Then enter the desired frequency offset. The Offset is a four digit number. The Display will show the direction of the offset.
BEEP 9	Press with the [FUNCTION] Key. THis key turns on and off the BEEP sound that occurs when you press a key. The display will show a little music symbol when the Beep function is on.
▼/− *	Press alone to decrease the operating frequency when in the VFO/DIAL mode. In the Memory mode this key will decrease the memory channel number. This key when pressed after the [SHIFT] key will select the minus offset.
▲/+ #	Press alone to increase the operating frequency when in the VFO/DIAL mode. In the Memory mode this key will increase the memory channel number. This key when pressed after the [SHIFT] key will select the positive offset.
CL/STOP A	Press alone. This key will clear any entered number and recall any previous frequency or will clear to "00". This key will also clear the Memory channel mode and enter VFO/Dial mode. This key is also used to stop the scan mode.
MR/MW B	Press alone. This Key will set the radio in the memory recall mode. Then press the 0 - 9 key to select a memory channel. Press with the [FUNCTION] Key. This Key will write the frequency in the VFO/DIAL mode into a memory channel. Then Press the memory channel number 0 - 9 to store the frequency in. The display will show a large "M" when in the memory mode.
MS/PS C	Press alone to select the memory scan mode. All memories will be scanned. Press with the [FUNCTION] Key to select the Frequency scan mode. Store the Lower frequency in memory channel 5 and the upper frequency limit in memory 6.
CALL/LOCK D	Press alone to select memory channel 3. All other keys, except the [A] key, will be ignored. Press with the [FUNCTION] Key to lock and unlock the keyboard.

Special Memory Channel Assignments

Memories 5 & 6 hold the high and low limits for programmed scan.

Memories 2 - 6 will have the same offset and PL tone as memory 1.

Memories 7 - 0 may all hold different offsets and PL tones.

Memory 4 - Priority frequency.

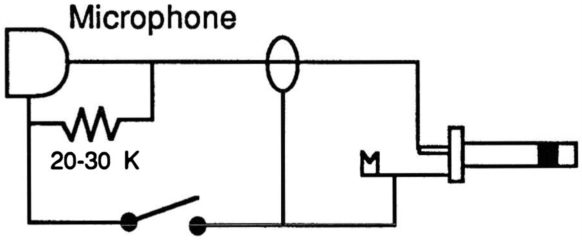
Memory 3 - Call Channel

Odd-split repeaters

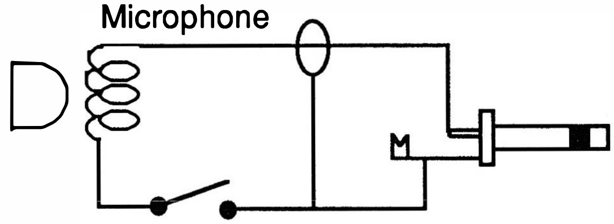
Change to offset using the [Shift] key. Then store the frequency, offset & PL into a memory CH (7 - 0).

Microphone Schematics

Electret Condenser Microphone



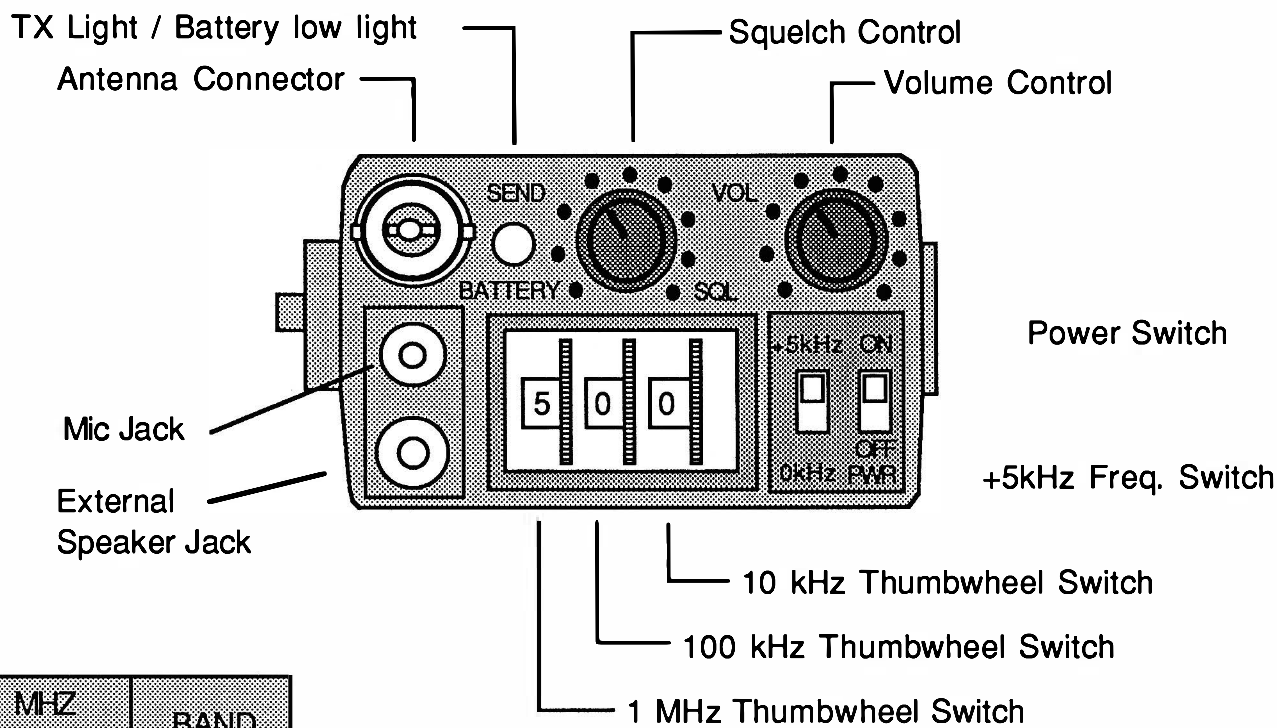
Dynamic Microphone



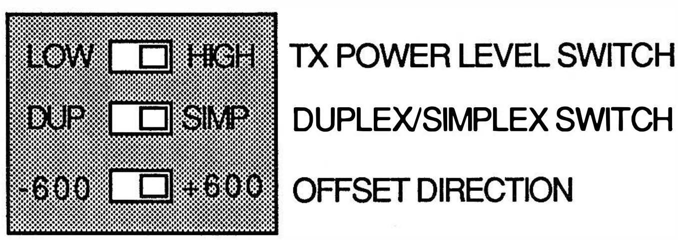
TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz
00	no tone	15	110.9	30	186.2	45	1600.0
01	67.0	16	114.8	31	192.8	46	1700.0
02	71.9	17	118.8	32	203.5	47	1750.0
03	74.4	18	123.0	33	210.7	48	1800.0
04	77.0	19	127.3	34	218.1	49	1900.0
05	79.7	20	131.8	35	225.7	50	2000.0
06	82.5	21	136.5	36	233.6	51	2200.0
07	85.4	22	141.3	37	241.8	52	2975.0
08	88.5	23	146.2	38	250.3	53	2550.0
09	91.5	24	151.4	39	500.0	54	2295.0
10	94.8	25	156.7	40	600.0	55	2125.0
11	97.4	26	162.3	41	700.0		
12	100.0	27	167.9	42	800.0		
13	103.5	28	173.8	43	900.0		
14	107.2	29	179.9	44	1000.0		

ICOM IC-XA

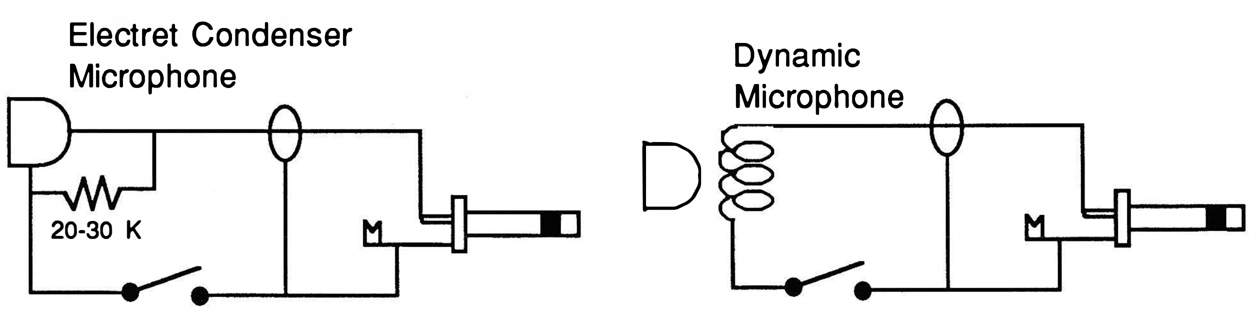
IC-2A, IC-3A, IC-4A



MHZ DIGIT	BAND
0	144
1	145
2	146
3	147
4	144
5	145
6	146
7	147
8	144
9	145



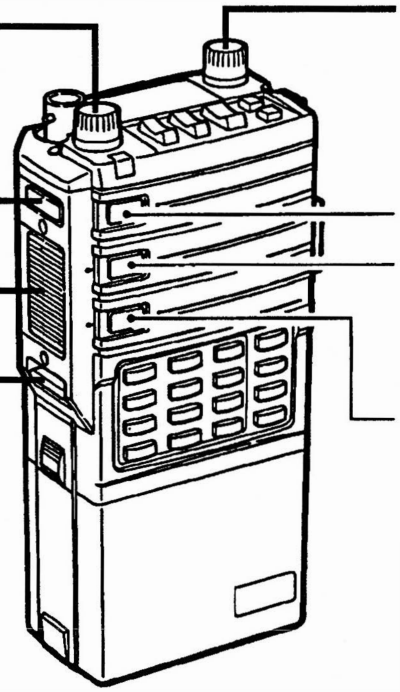
Microphone Schematics

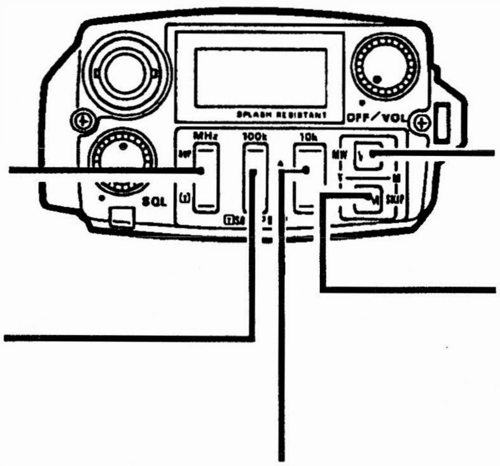


MEMORY #	FREQUENCY	OFFSET	PL TONE	OTHER
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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40				

ICOM IC-XGAT

ICOM IC-2GAT, IC-4GAT, IC-12GAT





	BP-2	BP-3	BP-5	BP-7	BP-8	BP-70
Capacity	400mAh	270 mAh	450mAh	450mAh	800mAh	270mAh
Voltage	7.2V	8.4V	10.8V	13.2V	8.4V	13.2V
Operation time	3.8 hrs	2.0 hrs	2.4 hrs	2.5 hrs	5.9 hrs	1.5 hrs

Key	FUNCTION Most Functions require pressing and holding the [FUNCTION] key.
FUNCTION	Press and hold to select the alternate key functions.
CALL	Press to select the CALL CHANNEL.. Press again to exit the call channel.
H/L	Press to toggle between high and low power modes. Press while holding [FUNCTION] to LOCK and UNLOCK the keyboard.
MONI	Press to open squelch and monitor transmit frequency. Press while holding [FUNCTION] to toggle keyboard beep tones on and off.
V/M	Press to toggle between VFO and MEMORY modes Press while holding [FUNCTION] in the Memory mode to toggle a memory to be a SKIP while scanning channel. The [SKIP] symbol will appear on the display. Press while holding [FUNCTION] in the VFO mode to select SET MODE functions.
WR	Press to start MEMORY WRITE function. (Hold for 3 beeps). Select memory channel. Select Frequency, offset, etc. Press [WR] again.
MHz DUP T	Press to change the MHz value of the VFO. Press UP while holding [FUNCTION] to toggle between Plus and Minus offset and Simplex. Press DOWN while holding [FUNCTION] to toggle the subaudible tone encoder on and off.
100k T SQL P.BEEP	Press to change the 100kHz value of the VFO or the Memory channel in Memory mode Press while holding [FUNCTION] to toggle Pocket beep and Tone Squelch on and off. T SQL will appear when the TONE Squelch is active. SQL will appear when the Pocket beep is active.
10k	Press to change the 10kHz value of the VFO or the Memory channel in Memory mode Press while holding [FUNCTION] to start the PROGRAMMED SCAN function.

Set mode (Press [V/M] while holding [FUNCTION].

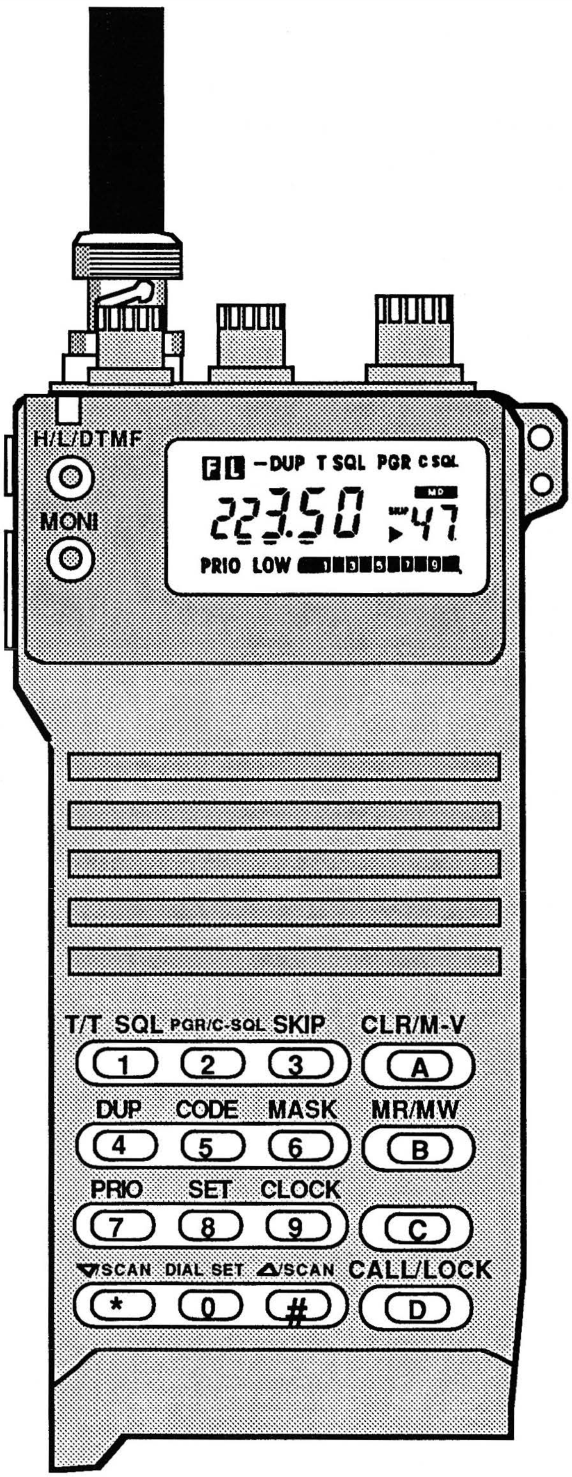
Tuning Step
Scan Edge A
Scan Edge B
Power saver on/off
Subaudible tone value
Offset value.

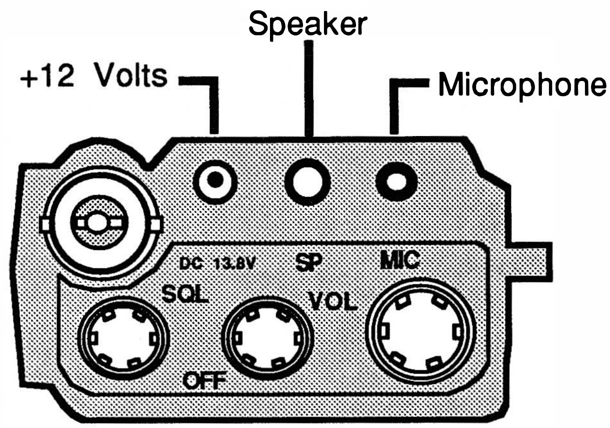
} Use the MHz, 100kHz and 10 kHz keys to change the values.

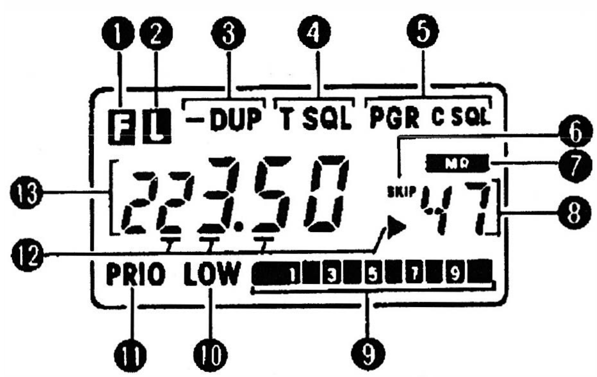
CPU RESET - Press and hold [LIGHT] and [FUNCTION] and turn power on.

ICOM IC-XSAT

ICOM IC-2SAT, IC-3SAT, IC-4SAT







1 - Function Indicator
2 - Lock Indicator
3 - Duplex Indicator
4 - Tone Indicator
5 - Code Squelch/Pager Indicator
6 - Skip Memory Indicator
7 - Memory mode indicator
8 - Memory channel
9 - Signal/TX power Meter
10 -Low TX power indicator
11 - Priority Indicator
12 - Dial Select Indicators
13 - Frequency Readout

Key	FUNCTION ICOM IC-XSAT Most Functions require pressing and holding the [FUNCTION] key.
T/T SQL 1	Toggle on/off the Tone and Tone Squelch (CTCSS) mode.
PGR/C-SQL 2	Toggle on and off the optional Pager/Code squelch mode.
SKIP 3	Toggle the memory channel scan skip mode. When a memory channel is set to be skipped, the Memory scan mode will bypass the memory channel.
DUP 4	Toggle the Repeater shift offset. The offset changes from -DUP to DUP+ back to simplex.
CODE 5	Program the options code memory for pager and code squelch functions.
MASK 6	Toggle the memory mask. Masking a memory makes it appear blank and will be skipped when manually searching the memories
PRIO 7	Toggle on and off the Priority watch mode. Select a memory or a VFO frequency and then switch mode to VFO/Memory and Press the [PRIO] Key.
SET 8	In VFO mode, enter/exit the SET mode to change, Subaudible tone,Scan Skip, Beep tone, Program scan edge A, Program scan edge B, Tuning Step and Offset Frequency.
CLOCK 9	Enter the Clock Mode
DIAL SET 0	Select the Frequency stepping in the VFO mode.
CLR/M-V A	In VFO mode, clears last entry. In Memory mode, enter the VFO mode Pressed with the [FUNCTION] key,transfers Memory ch. frequency in to the VFO.
MR/MW B	Enter the Memory mode. Pressed with the [FUNCTION] key, write VFO Frequency into a Memory Channel
C	No Function
CALL/LOCK D	Select the CALL Channel Pressed with the [FUNCTION] key, Lock/Unlock the Keyboard
▽/SCAN *	Start Program Scan in a downward direction
△/SCAN #	Start Program Scan in a upward direction
H/L/DTMF ◎	Select the Transmitter Power level. Pressed with the [FUNCTION] key, select the DTMF memory mode
MONI ◎	Press to Monitor the selected transmit Frequency for a signal.

ICOM IC-XSAT

Desired Function	Dial/Memory	Keystrokes
Programing CALL CH	D/M	CALL/LOCK (D) Select CALL CH + (F) Push & Hold + MR/MW (B) Hold for 3 beeps
CALL Channel Recall	D/M	CALL/LOCK (D)
Channel Step Selection	D	(F) Push & Hold + DIAL SET (0)
Hide/Unhide a Memory	M	(F) Push & Hold + MASK (6)
Lock/Unlock Keyboard	D/M	(F) Push & Hold + CALL/LOCK (D)
Memory Recall	D	MR/MW (B)
Memory Storage	D	(F) Push & Hold + MR/MW (B)
Skip/Unskip a Memory	M	(F) Push & Hold + SKIP (3)
Priority Mon (VFO)	D	(F) Push & Hold + PRIO (7)

Program a DTMF Memory	(F) Push & Hold + H/L/DTMF + (F) Push & Hold + (1) Select Memory No. 1 + (1) (0) Enter DTMF Digits + H/L/DTMF + H/L/DTMF
Transmit a DTMF Memory	(F) Push & Hold + H/L/DTMF + (F) Push & Hold + (1) Select Memory No. 1 + PTT + H/L/DTMF
Set the Clock	(F) Push & Hold + CLOCK (9) + ▲/SCAN (#) Select Clock Time + (F) Push & Hold + SET (8) + Dial Set Hours + ▲/SCAN (#) + Dial Set Minutes

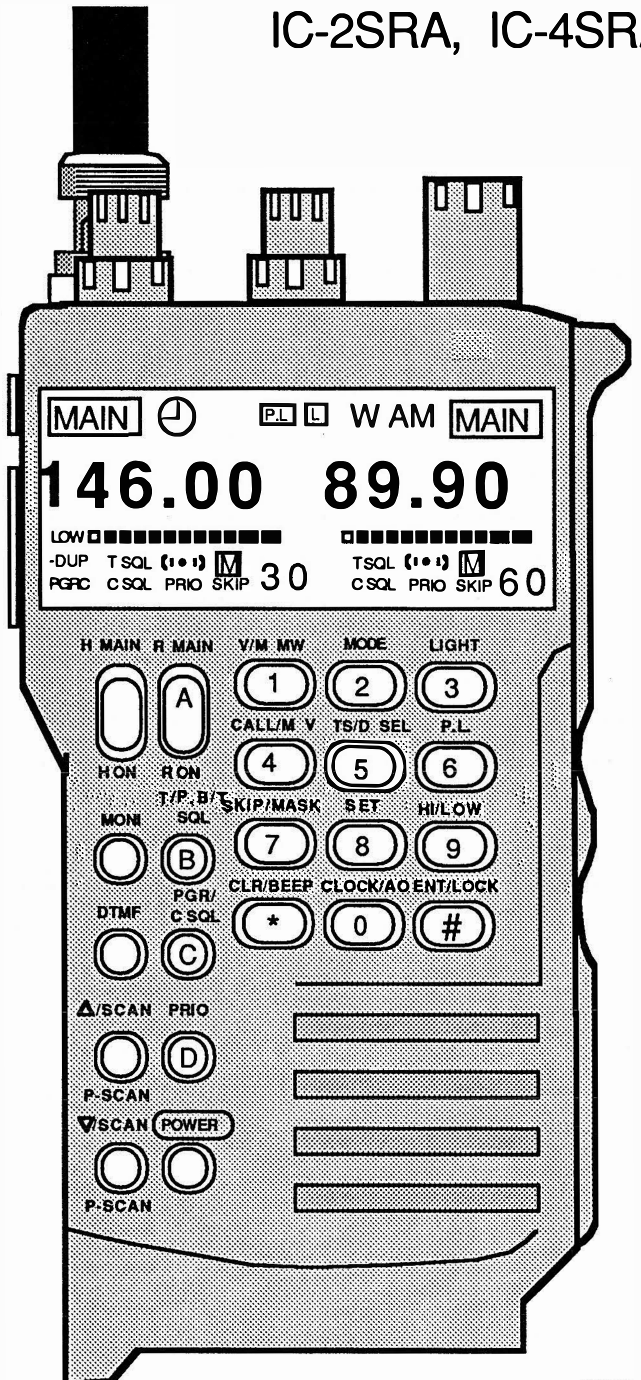
CLOCK MODE - Clock time, Power on timer (TM), Auto power off (AP)

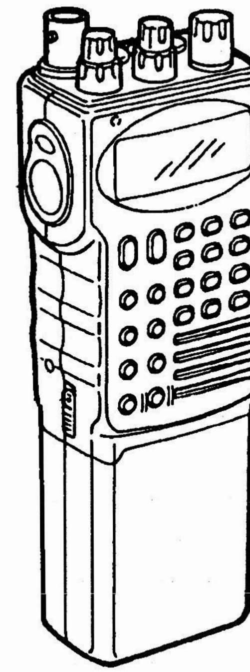
POWER SAVER FUNCTION		
	DEACTIVATED	PRIO (7) LIGHT PRESS AND HOLD + VOL TURN POWER ON
	125 msec. ON / 500 msec. OFF	SET (8) LIGHT PRESS AND HOLD + VOL TURN POWER ON
	125 msec. ON / 2 sec. OFF	CLOCK (9) LIGHT PRESS AND HOLD + VOL TURN POWER ON

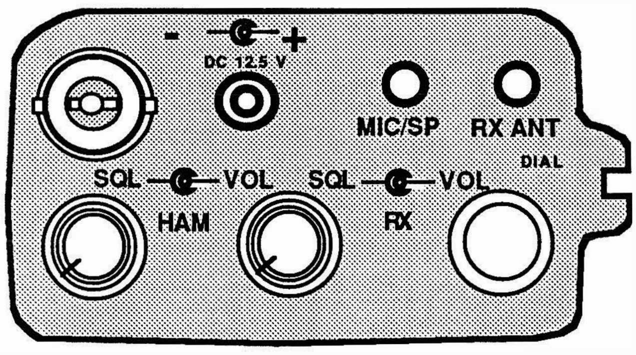
Notes

ICOM IC-XSRA

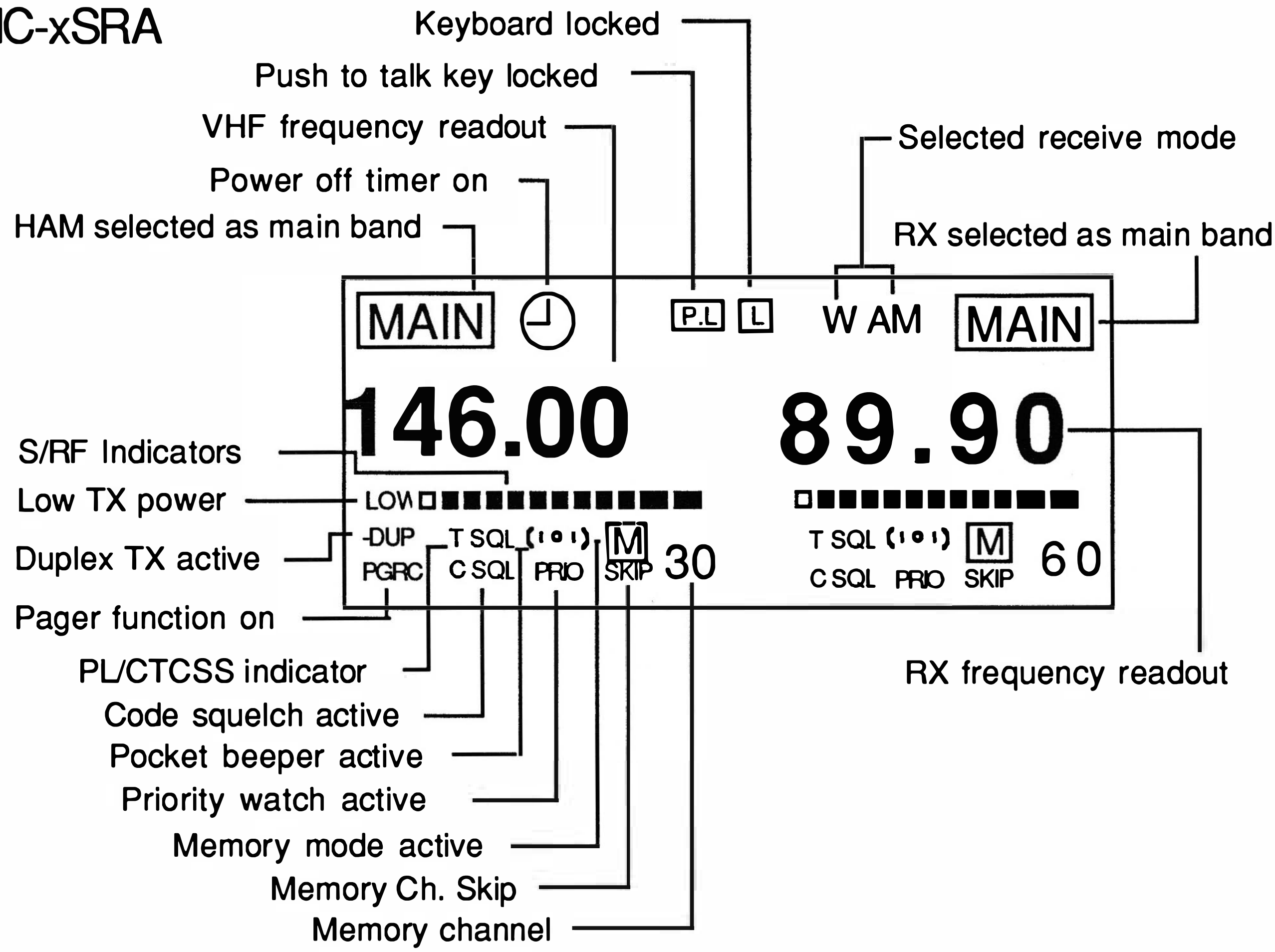
IC-2SRA, IC-4SRA







IC-xSRA



	FUNCTION	FUNCTION while pushing [F]
H MAIN / H ON	Select HAM band as the MAIN band.	Activates HAM only.
R MAIN / A / R ON	Select RX band as the MAIN band.	Acticates RX only.
MONI	Opens squelch on the main band	Opens squelch on the main sub band
T/P.B / T SQ / B / DUP	Turn on functions in order: subaudible tone encoder, pocket beep, tone squelch, normal operation.	Turn on function in order: minus duplex, positive duplex, simplex.
DTMF	Send/Transmit the programmed DTMF memory code.	Enter the DTMF MEMORY mode to program the DTMF memory.
PGR / C SQL / C	Turn on in sequence: Pager, Code Squelch, Normal	Program code memory for pager and code squelch.

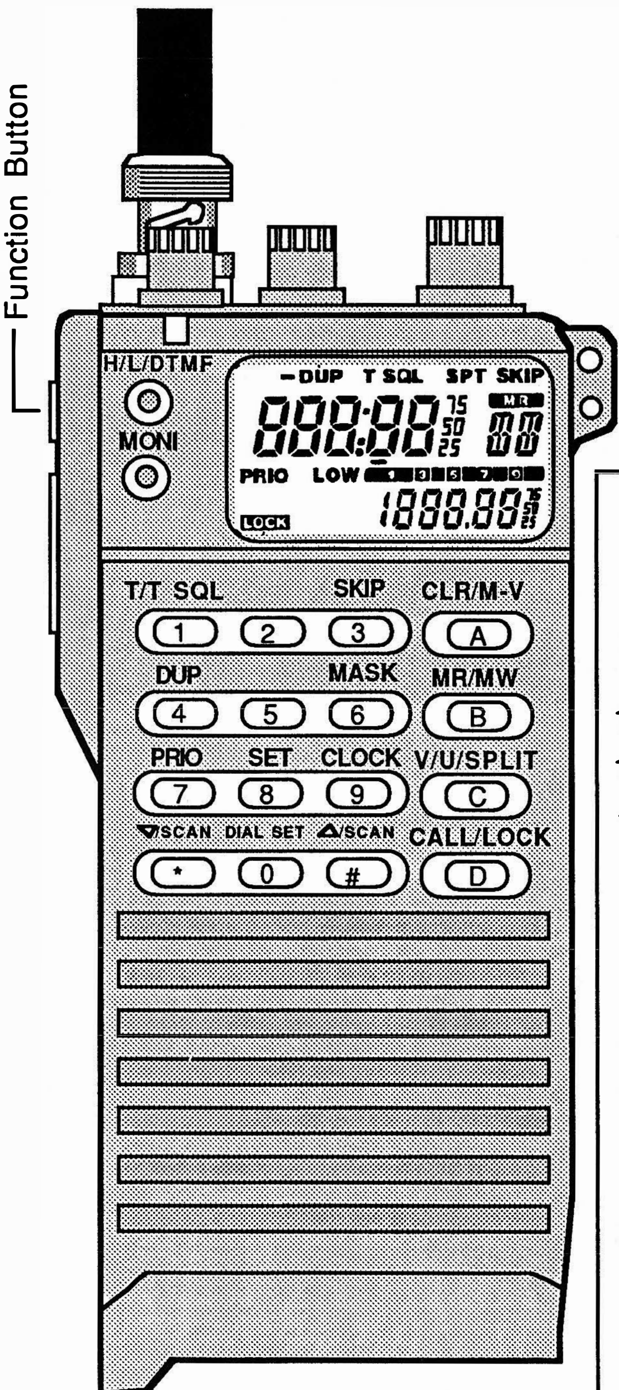
	FUNCTION	FUNCTION while pushing [F]
▲/SCAN ▼/SCAN P-SCAN	Change Frequency. Start Scan when pressed and held.	Start Scan when pressed and held.
PRIO (D)	Starts the Priority function.	None
POWER	Tune radio on and off when pressed and held for 1 second.	Tune radio on and off when pressed and held for 1 second.
V/M MW (1)	Select VFO or Memory mode	Write the VFO contents into the memory channel or Call channel
MODE (2)	Selects the Receive mode on RX band	None
LIGHT (3)	Turn ON the display light for 5 seconds.	Turn on display light with no automatic shut off.
CALL/M V (4)	Access the CALL chanel	Transfer Memory contents into the VFO.
TS/D SEL (5)	Select the tuning step. Use this button with the main dial.	Select the dial step. 100 kHz or 1 MHz or memory channel.
P.L. (6)	Frequency input only.	Lock or unlock PTT key.
SKIP/MASK (7)	Sets the selected memory as a skip during scan memory.	Hides or displays the selected memory channel, except CH 1.
SET (8)	Frequency input only.	Enter the SET mode.
HI/LOW (9)	Selects High or Low power.	Select low power in 3 levels. USe with main dial.
CLR/BEEP (*)	Clears last entry and exits the SET and CLOCK mode.	Toggle the beep function on and off.
CLOCK/AO (0)	Enters the CLOCK mode.	Toggle AUTO OFF function on and off.
ENT/LOCK (#)	Sets keyboard for Numeral input only	Toggle the Lock function on and off.

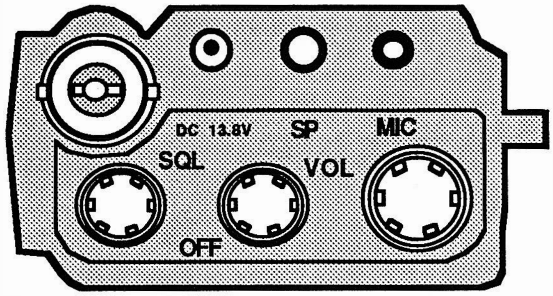
Desired Function	Dial/Memory	Keystrokes
Programing CALL CH	D	CALL/M V (4) Select CALL CH + (F) Push & Hold + V/M MW (1) Hold for 3 beeps
CALL Channel Recall	D/M	CALL/M V (4)
Channel Step Selection	D	TS/D SEL (5) + Dial Select step. + CLR/BEEP (*)
Hide/Unhide a Memory	M	(F) Push & Hold + SKIP/MASK (7)
Lock/Unlock Keyboard	D/M	(F) Push & Hold + ENT/LOCK (#)
Memory Recall	D	V/M MW (1)
Memory Storage	D	(F) Push & Hold + V/M MW (1) Hold for 3 beeps
Skip/Unskip a Memory	M	SKIP/MASK (7)
Priority Mon (VFO)	D	PRIO (D)

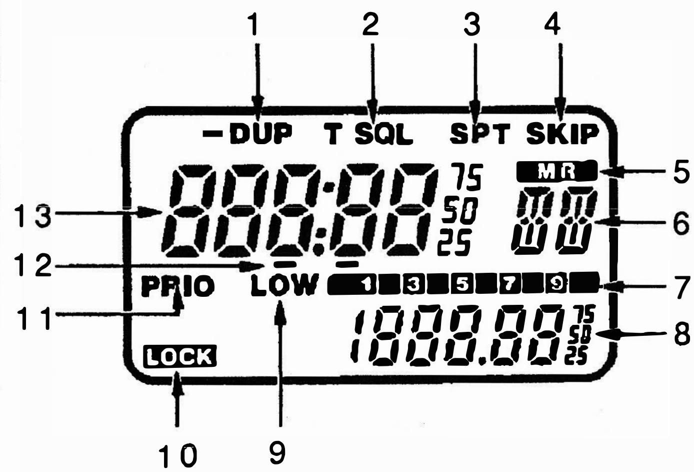
Program a DTMF Memory	(F) Push & Hold + DTMF ( ) + Dial Select DTMF Memory + (F) Push & Hold + SET (8) + (1)…(0) Enter DTMF Digits + DTMF ( ) + CLR/BEEP (*)
Transmit a DTMF Memory	(F) Push & Hold + DTMF ( ) + Dial Select DTMF Memory + CLR/BEEP (*) + PTT + DTMF ( )
Set the Clock	CLOCK/AO (0) + (F) Push & Hold + SET (8) + Dial Set Hour + V/SCAN P-SCAN + Dial Set Minutes + ENT/LOCK (#)

Battery	Output	1 Min TX 1 Min RX 8 min Standby	Continuous RX
BP-81	7.2 V	1 Hour	1 Hour
BP-82	7.2 V	2.5 Hours	3.6 Hour
BP-83	7.2 V	5.3 Hours	5.5 Hours
BP-84	7.2 V	9.2 Hours	9.2 Hours
BP-85	12.0 V	2.2 Hours	3.6 Hours

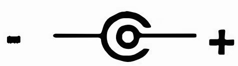
ICOM IC-24AT







1 - Duplex Indicator (Repeater offset)
2 - Tone Indicator (CTCSS)
3 - Split (Crossband Full Duplex Operation)
4 - Skip Indicator (skip memory)
5 - Memory mode Indicator
6 - Memory Channel number readout
7 - Signal Strength / RF meter
8 - Sub band frequency readout
9 - Low TX power Indicator
10 - Locked keyboard Indicator
11 - Priority Indicator
12 - Dial Select Indicator
13 - Main band frequency readout



DC 13.8V

Key	FUNCTION ICOM IC-24SAT Most Functions require pressing and holding the [FUNCTION] key.
T/T SQL 1	Toggle on/off the Tone and Tone Squelch (CTCSS) mode.
2	No Function
SKIP 3	Toggle the memory channel scan skip mode. When a memory channel is set to be skipped, the Memory scan mode will bypass the memory channel.
DUP 4	Toggle the Repeater shift offset. The offset changes from -DUP to DUP+ back to simplex.
5	No Function
MASK 6	Toggle the memory mask. Masking a memory makes it appear blank and will be skipped when manually searching the memories
PRIO 7	Toggle on and off the Priority watch mode. Select a memory or a VFO frequency and then switch mode to VFO/Memory and Press the [PRIO] Key.
SET 8	In VFO mode, enter/exit the SET mode to change, Subaudible tone,Scan Skip, Beep tone, Program scan edge A, Program scan edge B, Tuning Step and Offset Frequency.
CLOCK 9	Enter the Clock Mode
DIAL SET 0	Select the Frequency stepping in the VFO mode.
CLR/M-V A	In VFO mode, clears last entry. In Memory mode, enter the VFO mode Pressed with the [FUNCTION] key,transfers Memory ch. frequency in to the VFO.
MR/MW B	Enter the Memory mode. Pressed with the [FUNCTION] key, write VFO Frequency into a Memory Channel
V/U/SPLIT C	Change Main display band Pressed with the [FUNCTION] key, select full duplex operation.
CALL/LOCK D	Select the CALL Channel Pressed with the [FUNCTION] key, Lock/Unlock the Keyboard
▽/SCAN *	Start Program Scan in a downward direction
△/SCAN #	Start Program Scan in a upward direction
H/L/DTMF ◎	Select the Transmitter Power level. Pressed with the [FUNCTION] key, select the DTMF memory mode
MONI ◎	Press to Monitor the selected transmit Frequency for a signal.

Desired Function	Dial/Memory	Keystrokes
Programing CALL CH	D/M	CALL/LOCK (D) Select CALL CH + (F) Push & Hold + MR/MW (B) Hold for 3 beeps
CALL Channel Recall	D/M	CALL/LOCK (D)
Channel Step Selection	D	(F) Push & Hold + DIAL SET (0)
Hide/Unhide a Memory	M	(F) Push & Hold + MASK (6)
Lock/Unlock Keyboard	D/M	(F) Push & Hold + CALL/LOCK (D)
Memory Recall	D	MR/MW (B)
Memory Storage	D	(F) Push & Hold + MR/MW (B)
Skip/Unskip a Memory	M	(F) Push & Hold + SKIP (3)
Priority Mon (VFO)	D	(F) Push & Hold + PRIO (7)

Program a DTMF Memory	(F) Push & Hold + H/L/DTMF (◎) + (F) Push & Hold + (1) Select Memory No. 1 + (1)…(0) Enter DTMF Digits + H/L/DTMF (◎) + H/L/DTMF (◎)
Transmit a DTMF Memory	(F) Push & Hold + H/L/DTMF (◎) + (F) Push & Hold + (1) Select Memory No. 1 + PTT + H/L/DTMF (◎)
Set the Clock	(F) Push & Hold + CLOCK (9) + ▲/SCAN (#) Select Clock Time + (F) Push & Hold + SET (8) + Dial Set Hours + ▲/SCAN (#) + Dial Set Minutes

CLOCK MODE - Clock time, Power on timer (TM), Auto power off (AP)

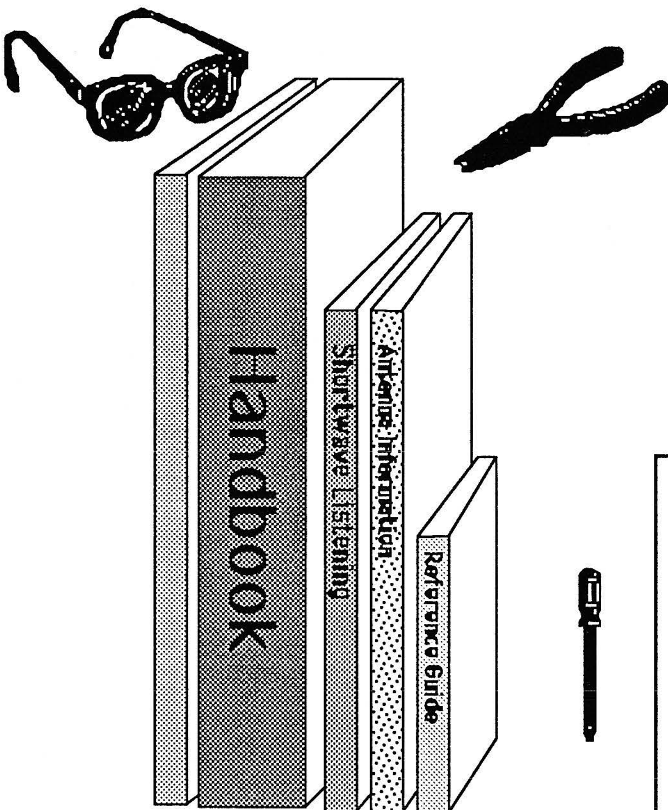
POWER SAVER FUNCTION	
DEACTIVATED	PRIO (7) LIGHT PRESS AND HOLD + VOL TURN POWER ON
125 msec. ON / 500 msec. OFF	SET (8) LIGHT PRESS AND HOLD + VOL TURN POWER ON
125 msec. ON / 2 sec. OFF	CLOCK (9) LIGHT PRESS AND HOLD + VOL TURN POWER ON

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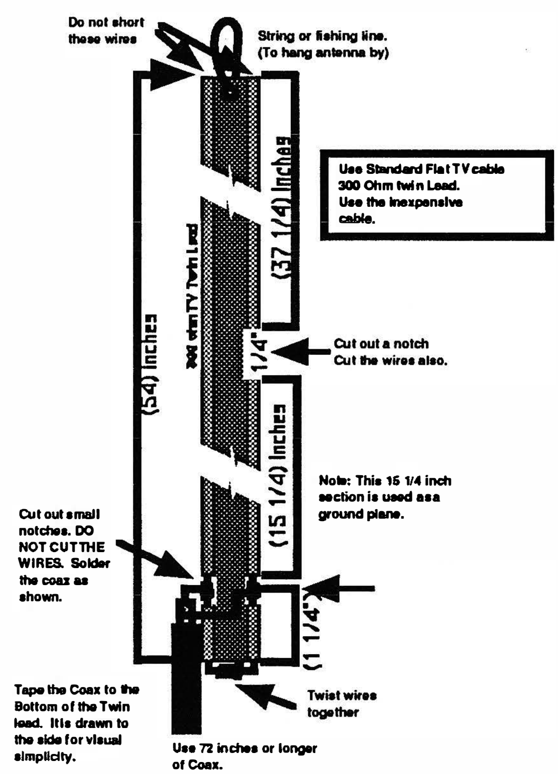
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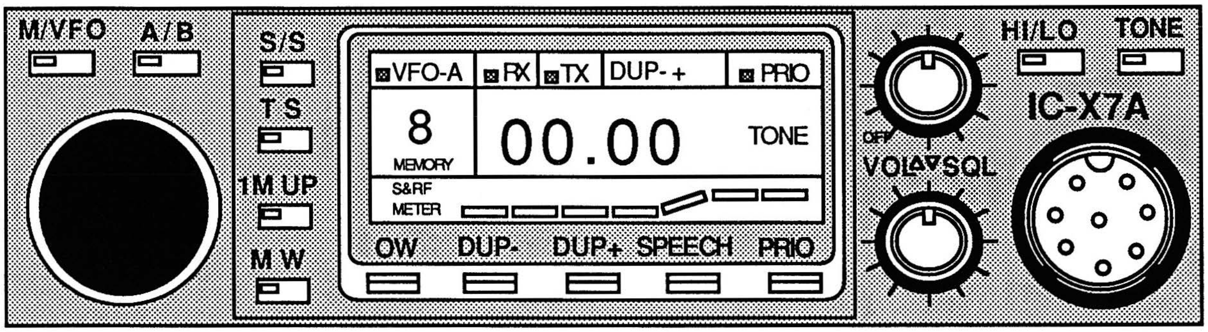
VHF Emergency Antenna

144 - 148 MHz. (J-Pole style)

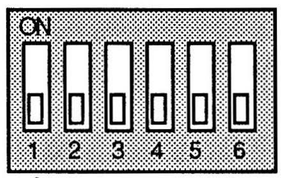


ICOM IC-X7A

IC-27A, IC-37A, IC-47A



Located under the cover on the top of the radio.



Scan speed switch
Select slow scan or fast scan mode.

Scan-Stop timer switch
Switch to disable the automatic resume scan mode.

Scan-Stop interval switch
Selects length of time to stop scanning when a signal is present. 3 seconds or 9 seconds.

Scan-Stop function switch
Switch to scan-stop on either a busy channel or a clear channel.

VFO-Scan mode switch
Change the VFO scan to programmed scan (PS) or full band scan

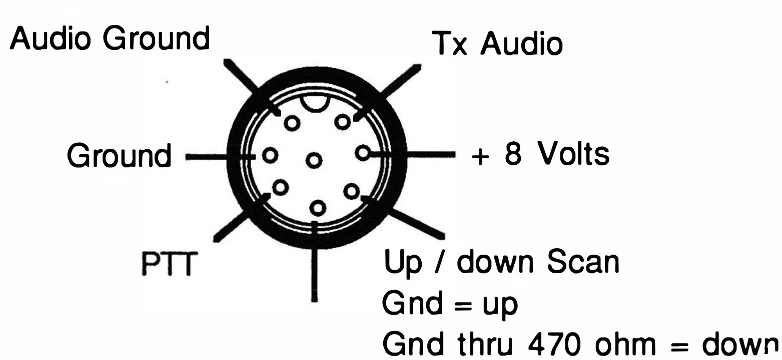
TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz	TONE No.	Frequency In Hz
00	no tone	15	110.9	30	186.2	45	1600.0
01	67.0	16	114.8	31	192.8	46	1700.0
02	71.9	17	118.8	32	203.5	47	1750.0
03	74.4	18	123.0	33	210.7	48	1800.0
04	77.0	19	127.3	34	218.1	49	1900.0
05	79.7	20	131.8	35	225.7	50	2000.0
06	82.5	21	136.5	36	233.6	51	2200.0
07	85.4	22	141.3	37	241.8	52	2975.0
08	88.5	23	146.2	38	250.3	53	2550.0
09	91.5	24	151.4	39	500.0	54	2295.0
10	94.8	25	156.7	40	600.0	55	2125.0
11	97.4	26	162.3	41	700.0		
12	100.0	27	167.9	42	800.0		
13	103.5	28	173.8	43	900.0		
14	107.2	29	179.9	44	1000.0		

Key	FUNCTION ICOM IC-X7A
M/VFO	Toggle between Memory mode and VFO modes. An "M" appears on the display when in the memory mode.
A/B	Toggle between VFO A and VFO B. VFO A is active when the display shows VFO A. VFO B is active when the display is out.
S/S	Scan start and scan stop button. Memory 0 and 1 are used to store the band scan limits.
T S	Press and hold to change frequency step by 5 khz steps when you turn the tuning knob. The default step is 10 khz.
1M UP	Press to change the frequency by 1 MHz steps.
M W	In VFO mode, press to store frequency in last selected memory channel. In memory mode, press to monitor the TX Freq.
OW	Press and hold to change "DUP" offset default. Use the DUP - and DUP + buttons to change offset up or down. Then store in a memory.
DUP-	Press to select a minus (-) offset value.
DUP+	Press to select a plus (+) offset value.
SPEECH	Push to turn on optional speech synthesizer.
PRIO	Push to select a priority memory channel. The momory will be scanned every 5 seconds for activity.
HI/LO	Press to toggle hi and low power TX mode. The S-Meter/RF bar display will show the output power level when you transmit.
TONE	Press to change the desired PL tone. See PL chart.

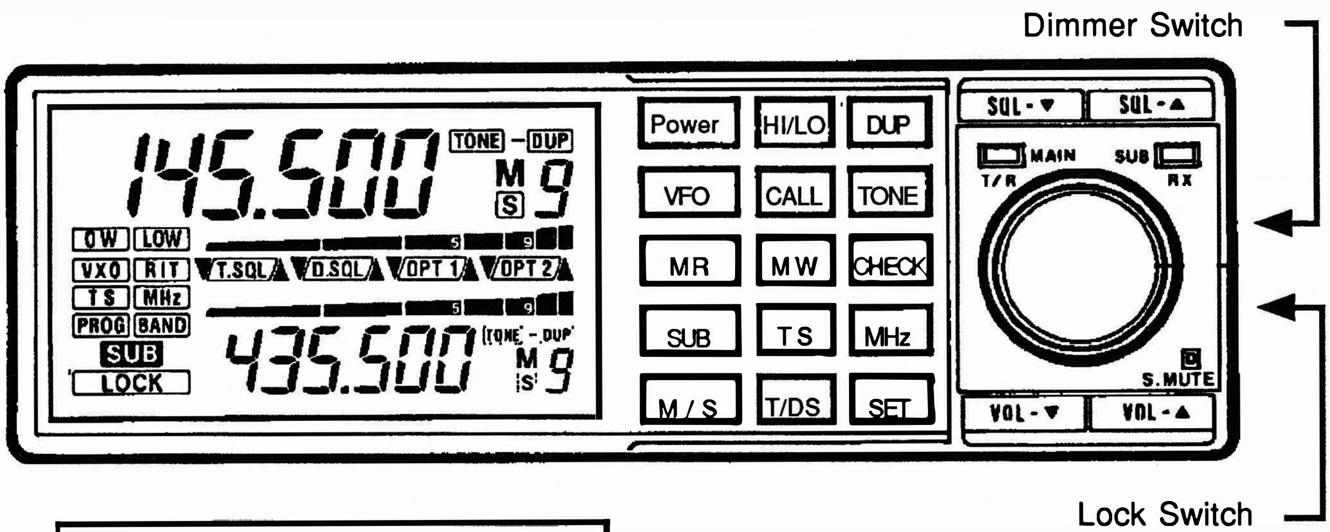
Memory Storage Hint

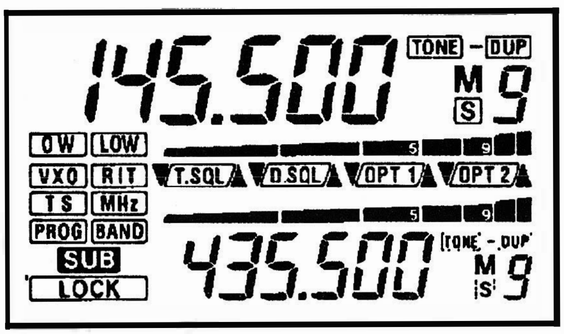
Store a frequency in memory and then while in the memory mode, select the offest and PL tone value.

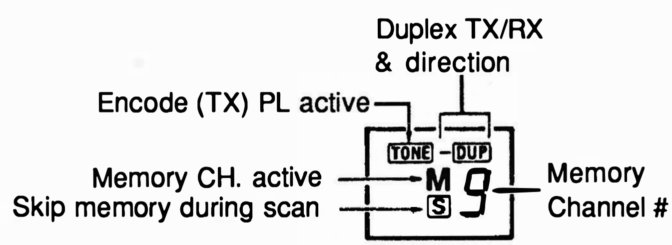
Each memory channel can store different PL tones and offset values.

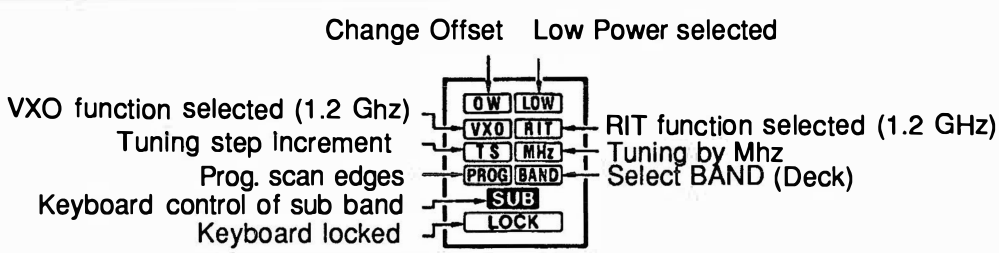


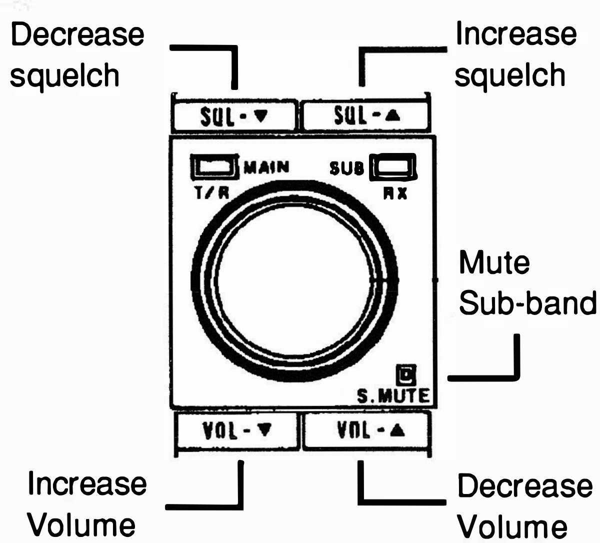
ICOM IC-900

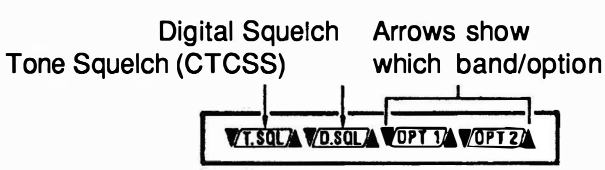

Dimmer Switch
145.500
TONE
DUP
M
S
OW
LOW
VXO
RIT
T.SQL
D.SQL
OPT 1
OPT 2
TS
MHz
PROG
BAND
SUB
LOCK
435.500
Power
HI/LO
DUP
VFO
CALL
TONE
MR
MW
CHECK
SUB
TS
MHz
M / S
T/DS
SET
SQL-▼
SQL-▲
MAIN
SUB
T/R
RX
S.MUTE
VOL-▼
VOL-▲
Lock Switch


145.500
TONE
DUP
M
S
OW
LOW
VXO
RIT
T.SQL
D.SQL
OPT 1
OPT 2
TS
MHz
PROG
BAND
SUB
LOCK
435.500


Duplex TX/RX
& direction
Encode (TX) PL active
TONE
DUP
Memory CH. active
Skip memory during scan
M
S
Memory
Channel #


Change Offset
Low Power selected
VXO function selected (1.2 Ghz)
Tuning step Increment
Prog. scan edges
Keyboard control of sub band
Keyboard locked
OW
LOW
VXO
RIT
TS
MHz
PROG
BAND
SUB
LOCK
RIT function selected (1.2 GHz)
Tuning by Mhz
Select BAND (Deck)


Decrease
squelch
Increase
squelch
SQL-▼
SQL-▲
MAIN
SUB
T/R
RX
Mute
Sub-band
S.MUTE
VOL-▼
VOL-▲
Increase
Volume
Decrease
Volume


Digital Squelch
Tone Squelch (CTCSS)
Arrows show
which band/option
T.SQL
D.SQL
OPT 1
OPT 2

Keyboard key functions

Key	Function
Power	Press to turn power on and off.
VFO	Press to select VFO tuning mode.
MR	Press to select Memory channel mode. In Memory Mode, press to scan skip/unskip a memory channel
SUB	Press to select keyboard control of the Sub band.
M / S	Press to switch the main and sub band frequencies.
HI/LO	Press to select High or low power.
CALL	Press to select the CALL Channel.
M W	Press to program the current VFO frequency into a memory channel. In Memory mode, press to transfer memory to the VFO.
T S	Press to select the tuning step increment.
T/DS	Press to select the option squelch units.
DUP	Press to select duplex offset direction.
TONE	Press to activate PL tome encode (TX).
CHECK	Press to monitor the TX frequency (during DUP operation).
MHz	Press to select 1 MHz tuning step.
SET	Press to select the SET MODE FUNCTIONS.

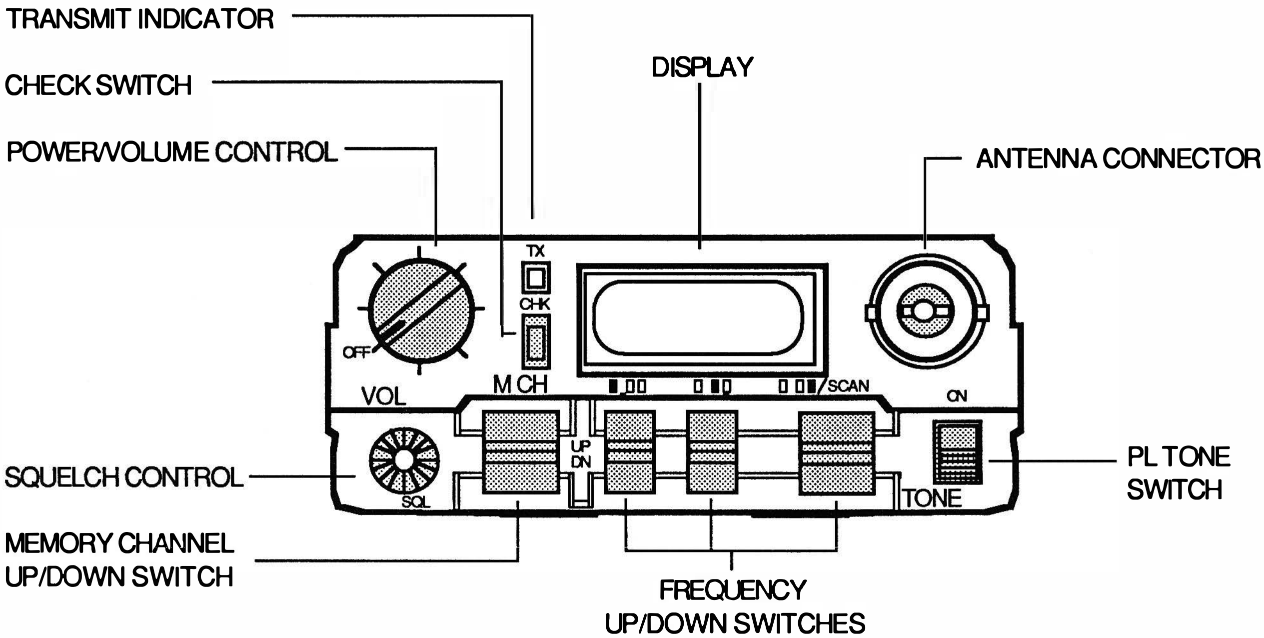
Set Mode Menu

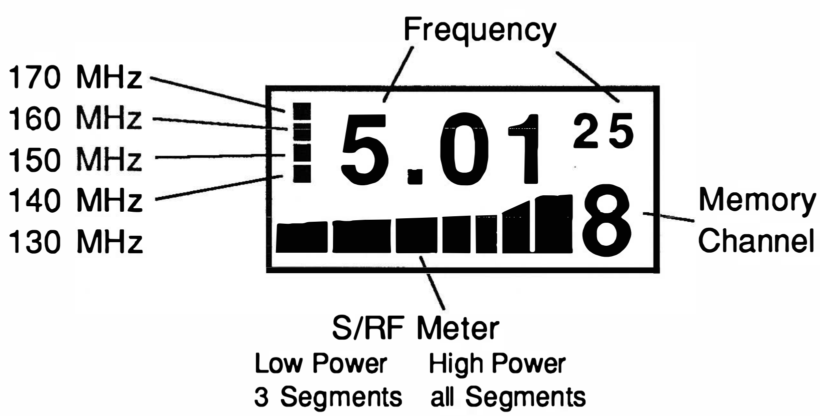
Press the [SET] Button

- Band Selection
- Tuning Step (A)
- Tuning Step (B) (RIT & VXO)
- Offset Write
- PL Tone
- Scan Edge (A)
- Scan Edge (B)
- Optional Unit Control

ICOM -µ_ A/AT

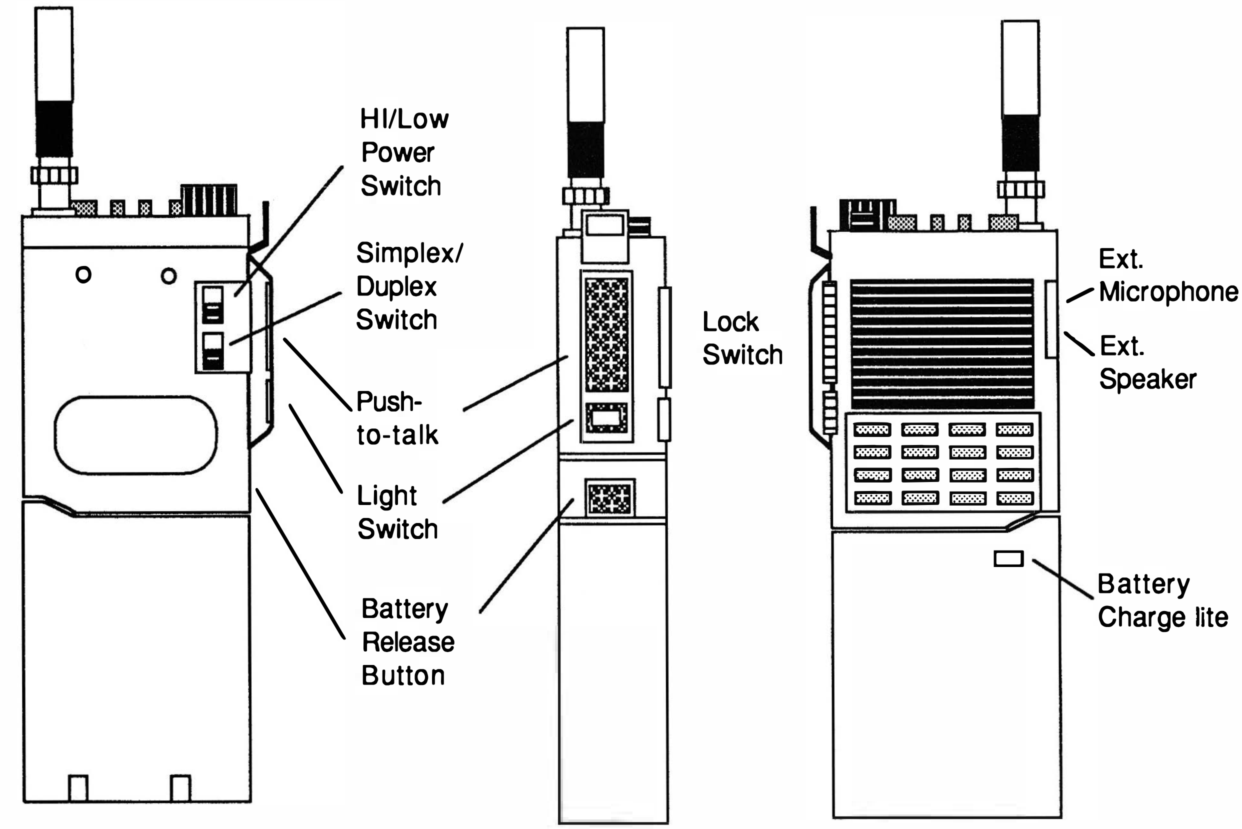
ICOM IC-µ2, IC-µ4



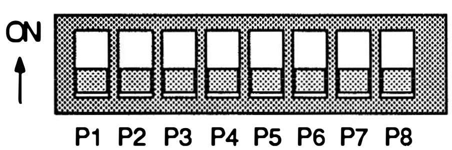


The Icom µ_ radios have 10 Memory/VFO's. Each memory is a seperate VFO. To program a frequency, first select a memory channel and then select the desired Frequency.

PL tones are controlled by turning on the PL tone switch and selecting the desired PL tone using dip switches. The dip switches are located on the bottom of the radio. You must slide off the battery pack to access the switches.



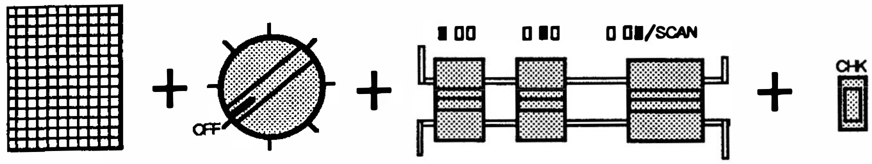
SUBAUDIBLE TONE OPERATION



[TONE] SWITCH MUST BE IN THE ON MODE

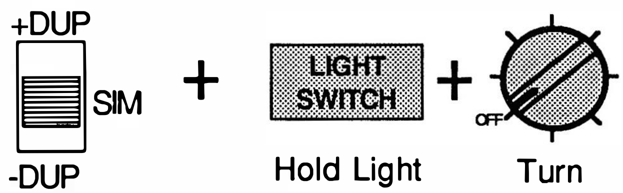
FREQ (Hz)	P1	P2	P3	P4	P5	P6	FREQ (Hz)	P1	P2	P3	P4	P5	P6	FREQ (Hz)	P1	P2	P3	P4	P5	P6
67.0	1	0	0	0	0	0	107.2	0	1	1	1	0	0	167.9	1	1	0	1	0	0
71.9	0	1	0	0	0	0	110.9	1	1	1	1	0	0	173.8	0	0	1	1	0	0
74.4	1	1	0	0	0	0	114.8	0	0	0	0	1	0	179.9	1	0	1	1	1	0
77.0	0	0	1	0	0	0	118.8	1	0	0	0	1	0	186.2	0	1	1	1	1	0
79.7	1	0	1	0	0	0	123.0	0	1	0	0	1	0	192.8	1	1	1	1	1	0
82.5	0	1	1	0	0	0	127.3	1	1	0	0	1	0	203.5	0	0	0	0	1	1
85.4	1	1	1	0	0	0	131.8	0	0	1	0	1	0	210.7	1	0	0	0	1	1
88.5	0	0	0	1	0	0	136.5	1	0	1	0	1	0	218.1	0	1	0	0	1	1
91.5	1	0	0	1	0	0	141.3	0	1	1	0	1	0	225.7	1	1	0	0	1	1
94.8	0	1	0	1	0	0	146.2	1	1	1	0	1	0	233.6	0	0	1	0	1	1
97.4	1	1	0	1	0	0	151.4	0	0	0	1	1	0	241.8	1	0	1	0	1	1
100.0	0	0	1	1	0	0	156.7	1	0	0	1	1	0	250.3	0	1	1	0	1	1
103.5	1	0	1	1	0	0	162.3	0	1	0	1	1	0							

CHANGE THE FREQUENCY OFFSET

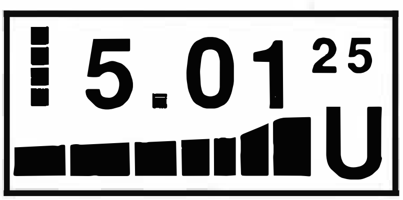


Hold PTT Switch + Turn Power on + Select new Offset + Press Chk Button

RESET THE CPU



Select Simplex Mode + Hold Light Switch + Turn Power on



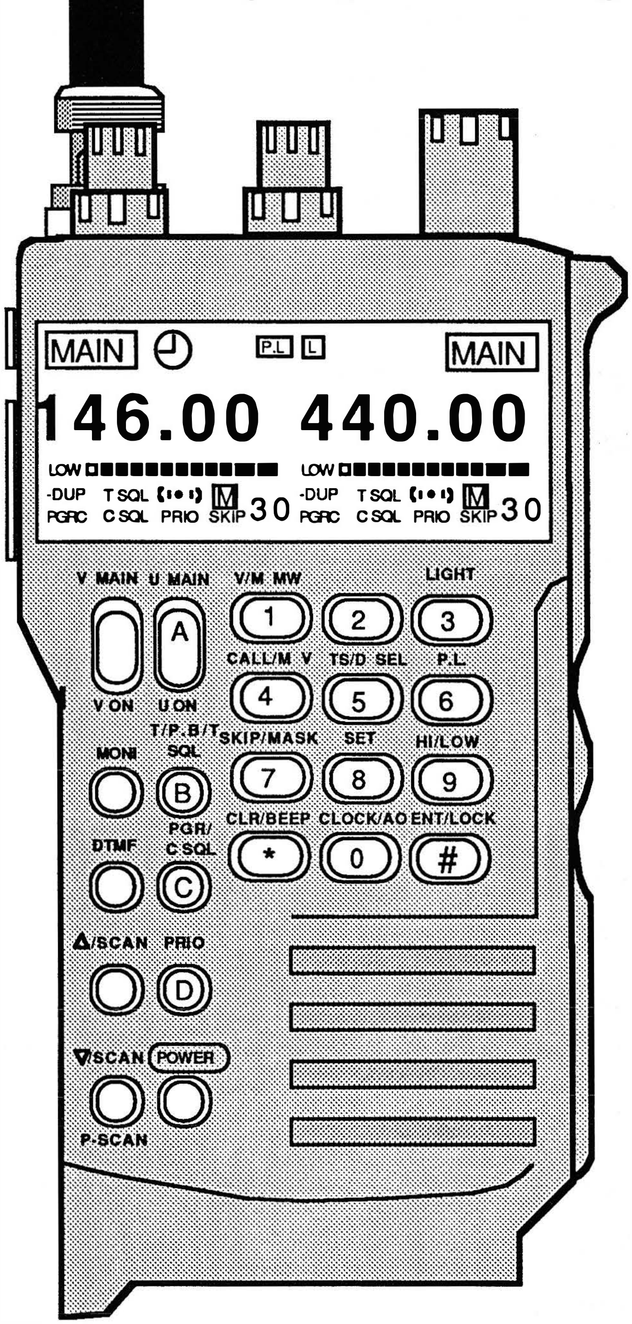
A "U" will appear in the memory channel indicator when the PLL can not lock up on selected frequency.

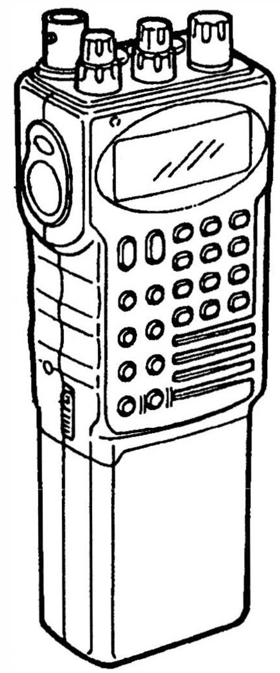
	µ2a/at	µ4a/at
Frequency RX Range TX	140 - 140 MHz 140 - 163 MHz	440 - 450 MHz
Current Drain Squelched Max Audio TX .1 watts TX 1 watts	 30mA 170mA .30 Amps .60 Amps	 30mA 170mA .30 Amps .60 Amps
Sensitivity	.25uv	.25uv
Audio Output Power	.25 Watts	.25 Watts

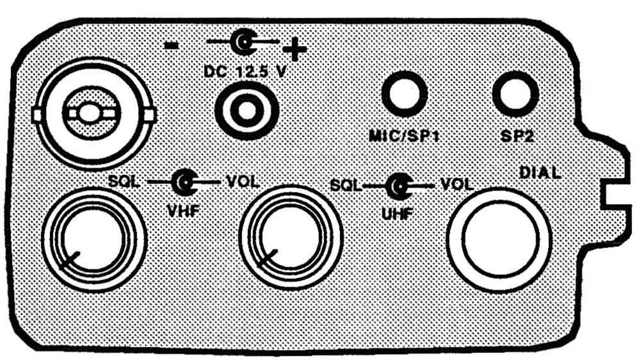
Accessory List ICOM UxAT

AD-10	Charger Adapter for BC-35 Desktop Charger
BC-16U	Wall Charger for BP-23 and BP-24 Battery Packs
BC-25U	Wall Charger for BP-21 and BP-22 Battery Packs
BC-50	Desktop Quick Charger foor all Micro Battery Packs
BP-20	Alkaline Battery Case
BP-21	120mAH @ 7.2V NICd Battery Pack
BP-22	270mAH @ 8.4V NICd Battery Pack
BP-23	600mAH @ 8.4V NICd Battery Pack
BP-24	600mAH @ 10.8V NICd Battery Pack
IC-CP1	Cigarette Lighter Plug and Cord
DC-25	DC-DC Converter
IC-HM9	Spealer Mic
HS-10	Headset with Boom Mic
HS-10SA	VOX Unit for use with HS-10
HS-SB	PTT Unit for use with HS-10
LC-24	Carring Case for BP-21 Battery
LC-25	Carring Case for BP-20 Battery
LC-26	Carring Case for BP-22, BP-23 & DC-24 Battery
LC-27	Carring Case for BP-24 Battery
LC-28	Carring Case for BP-21 Battery
LC-29	Carring Case for BP-20 Battery
LC-30	Carring Case for BP-22 Battery
LC-31	Carring Case for BP-24 Battery
MB-20	Belt Clip
S-STRAP	Shoulder Strap
YT-37	Tone Qsuelch Unit
UT-38	DTMF Unit
UT-39	Tone Encoder Unit

ICOM IC-W2A

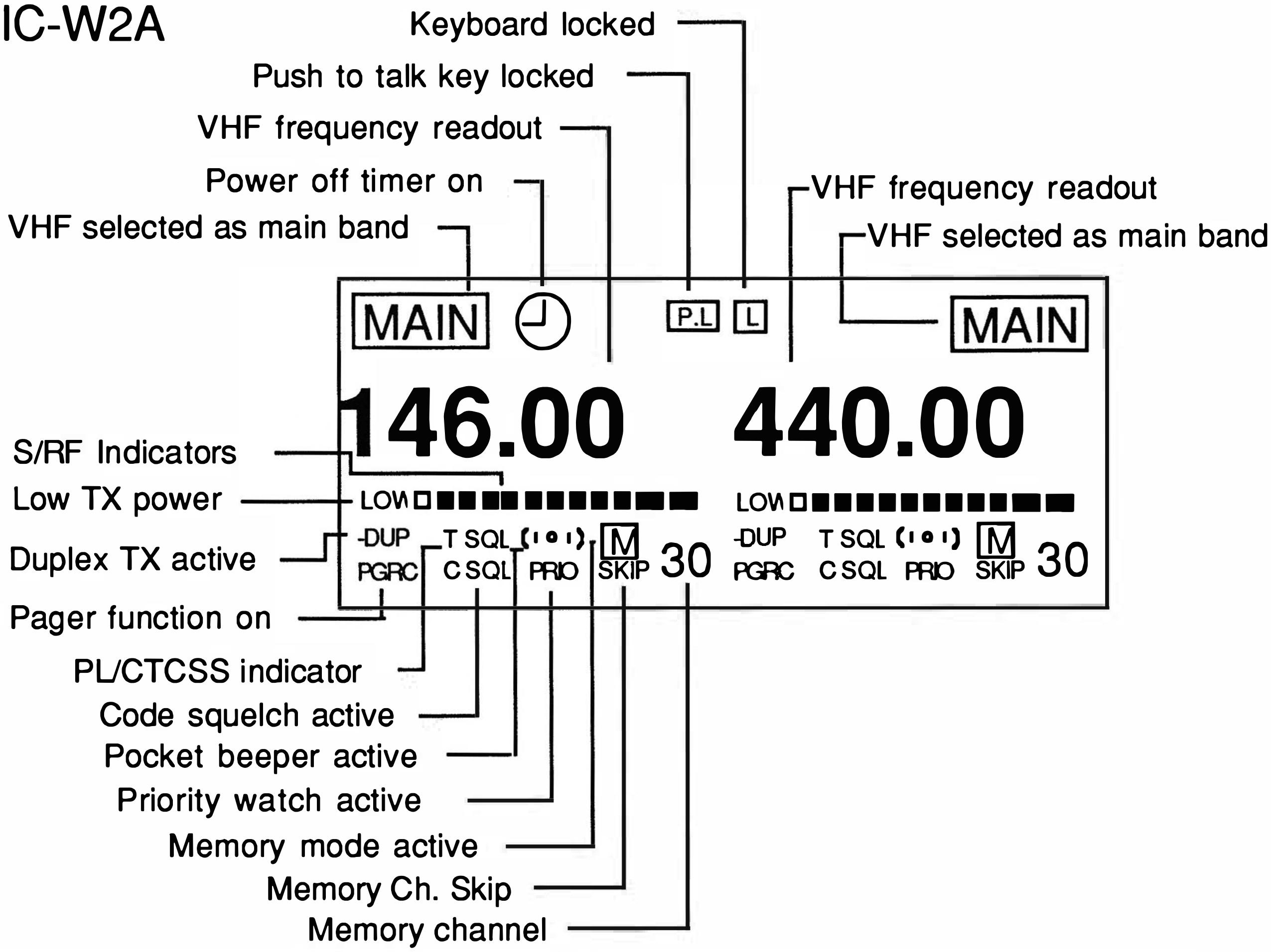






	Internal Speaker	Sp1 Output	Sp2 Output
No external Jacks	VHF/UHF Mixed	---	---
With SP1 Jack	---	VHF/UHF mixed	---
SP2 jack only	VHF	---	UHF
Both SP1&SP2	---	VHF	UHF

IC-W2A



	FUNCTION	FUNCTION while pushing [F]
V MAIN / V ON	Select VHF band as the MAIN band.	Activates VHF only.
U MAIN / (A) / U ON	Select UHF band as the MAIN band.	Acticates UHF only.
MONI	Opens squelch on the main band	Opens squelch on the main sub band
T/P. / T SQ / (B) / DUP	Turn on functions in order: subaudible tone encoder, pocket beep, tone squelch, normal operation.	Turn on function in order: minus duplex, positive duplex, simplex.
DTMF	Send/Transmit the programmed DTMF memory code.	Enter the DTMF MEMORY mode to program the DTMF memory.
PGR / C SQL / (C)	Turn on in sequence: Pager, Code Squelch, Normal	Program code memory for pager and code squelch.

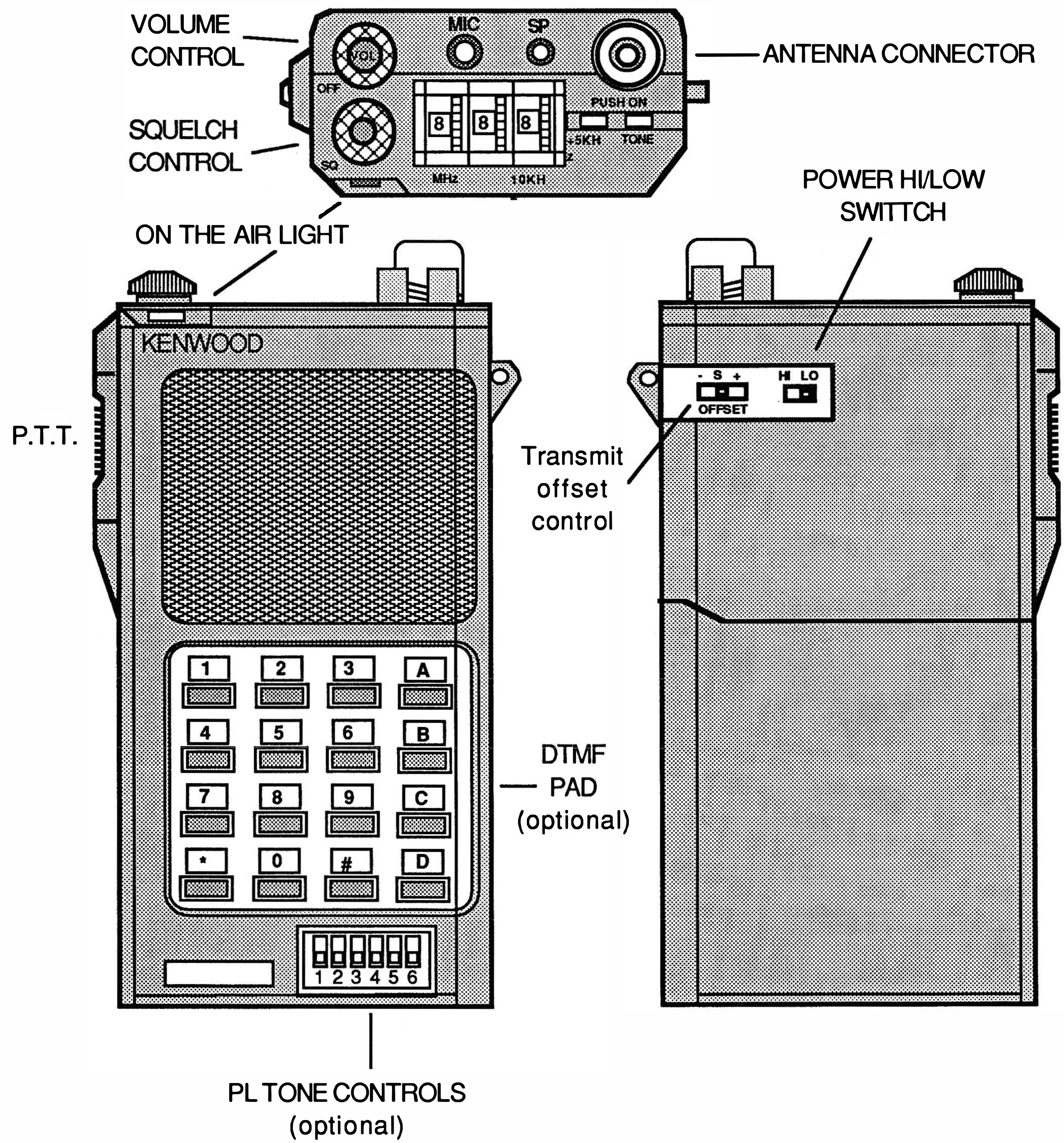
	FUNCTION	FUNCTION while pushing [F]
▲/SCAN ▼/SCAN P-SCAN	Change Frequency. Start Scan when pressed and held.	Start Scan when pressed and held.
PRIO (D)	Starts the Priority function.	None
POWER	Tune radio on and off when pressed and held for 1 second.	Tune radio on and off when pressed and held for 1 second.
V/M MW (1)	Select VFO or Memory mode	Write the VFO contents into the memory channel or Call channel
(2)	Frequency input only.	None
LIGH1 (3)	Turn ON the display light for 5 seconds.	Turn on display light with no automatic shut off.
CALL/M V (4)	Access the CALL chanel	Transfer Memory contents into the VFO.
TS/D SEL (5)	Select the tuning step. Use this button with the main dial.	Select the dial step. 100 kHz or 1 MHz or memory channel.
P.L. (6)	Frequency input only.	Lock or unlock PTT key.
SKIP/MASK (7)	Sets the selected memory as a skip during scan memory.	Hides or displays the selected memory channel, except CH 1.
SET (8)	Frequency input only.	Enter the SET mode.
HI/LOW (9)	Selects High or Low power.	Select low power in 3 levels. USe with main dial.
CLR/BEEP (*)	Clears last entry and exits the SET and CLOCK mode.	Toggle the beep function on and off.
CLOCK/AO (0)	Enters the CLOCK mode.	Toggle AUTO OFF function on and off.
ENT/LOCK (#)	Sets keyboard for Numeral input only	Toggle the Lock function on and off.

Desired Function	Dial/Memory	Keystrokes
Programing CALL CH	D	CALL/M V [4] Select CALL CH + [F] Push & Hold + V/M MW [1] Hold for 3 beeps
CALL Channel Recall	D/M	CALL/M V [4]
Channel Step Selection	D	TS/D SEL [5] + Dial Select step. + CLR/BEEP [*]
Hide/Unhide a Memory	M	[F] Push & Hold + SKIP/MASK [7]
Lock/Unlock Keyboard	D/M	[F] Push & Hold + ENT/LOCK [#]
Memory Recall	D	V/M MW [1]
Memory Storage	D	[F] Push & Hold + V/M MW [1] Hold for 3 beeps
Skip/Unskip a Memory	M	SKIP/MASK [7]
Priority Mon (VFO)	D	PRIO [D]
Program a DTMF Memory		[F] Push & Hold + DTMF [ ] + Dial Select DTMF Memory + [F] Push & Hold + SET [8] + [1] … [0] Enter DTMF Digits + DTMF [ ] + CLR/BEEP [*]
Transmit a DTMF Memory		[F] Push & Hold + DTMF [ ] + Dial Select DTMF Memory + CLR/BEEP [*] + PTT + DTMF [ ]
Set the Clock		CLOCK/AO [0] + [F] Push & Hold + SET [8] + Dial Set Hour + V/SCAN P-SCAN [ ] + Dial Set Minutes + ENT/LOCK [#]

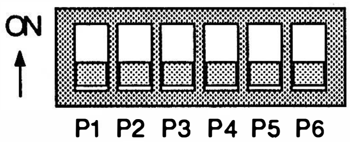
Notes

KENWOOD TH-X1A/BT

KENWOOD TH-21, TH-31, TH-41



SUBAUDIBLE TONE OPERATION



[TONE] SWITCH MUST BE IN THE ON MODE

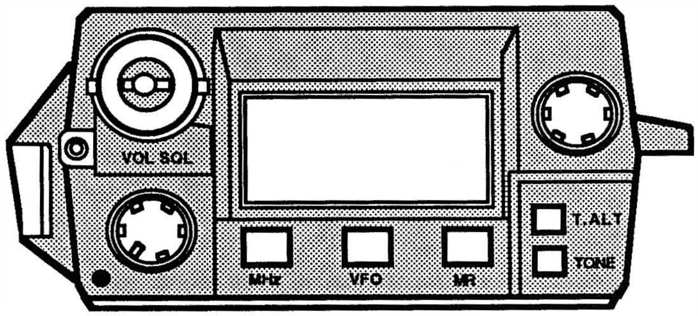
FREQ (Hz)	P1	P2	P3	P4	P5	P6	FREQ (Hz)	P1	P2	P3	P4	P5	P6	FREQ (Hz)	P1	P2	P3	P4	P5	P6
67.0	0	0	0	0	0	0	110.9	0	1	0	0	1	0	173.8	1	0	1	0	1	1
71.9	0	0	0	0	1	0	114.8	0	1	0	0	1	1	179.9	1	0	1	1	1	0
74.4	0	0	0	1	0	0	118.8	0	1	0	1	1	0	186.2	1	0	1	1	1	1
77.0	0	0	0	0	1	1	123.0	0	1	0	1	1	1	192.8	1	1	0	0	1	0
79.7	0	0	1	0	0	0	127.3	0	1	1	0	1	0	203.5	1	1	0	0	1	1
82.5	0	0	0	1	1	0	131.8	0	1	1	0	1	1	210.7	1	1	0	1	1	0
85.4	0	0	1	1	0	0	136.5	0	1	1	1	1	0	218.1	1	1	0	1	1	1
88.5	0	0	0	1	1	1	141.3	0	1	1	1	1	1	225.7	1	1	1	0	1	0
91.5	0	1	0	0	0	0	146.2	1	0	0	0	1	0	233.6	1	1	1	0	1	1
94.8	0	0	1	0	1	0	151.4	1	0	0	0	1	1	241.8	1	1	1	1	1	0
100.0	0	0	1	0	1	1	156.7	1	0	0	1	1	0	250.3	1	1	1	1	1	1
103.5	0	0	1	1	1	0	162.3	1	0	0	1	1	1							
107.2	0	0	1	1	1	1	167.9	1	0	1	0	1	0							

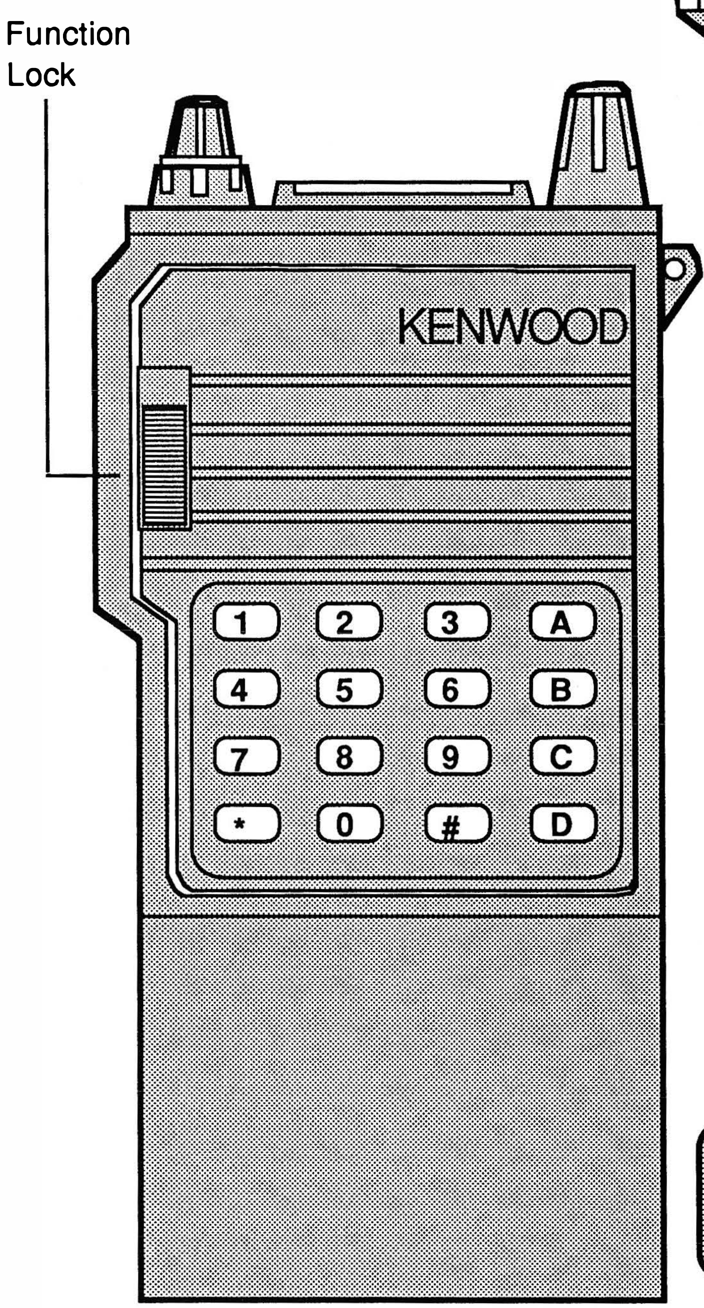
SPECIFICATIONS

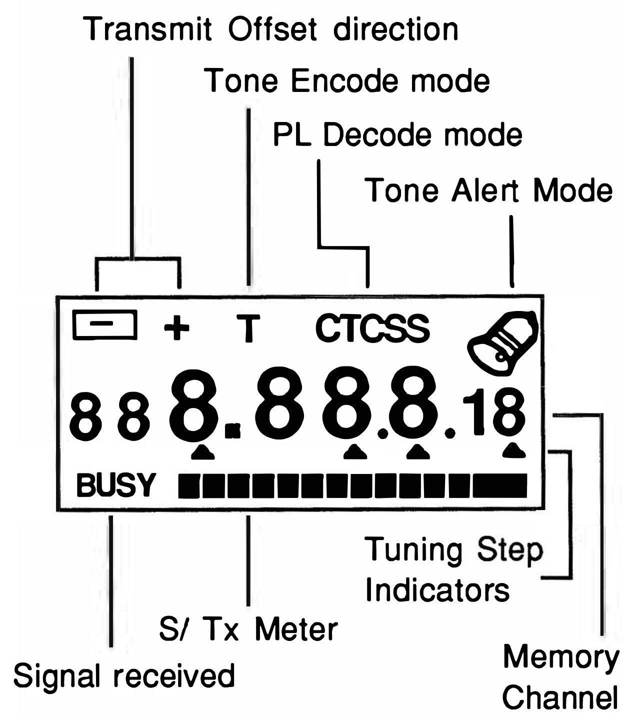
	TH-21	TH-31	TH-41
Freq. Range in MHz	144-148	220-225	440-450
Current drain TX/RX	650ma/28ma	650ma/30ma	650ma/30ma
Output Power in Watts	1/ 1.	1/.1	1/.1
Sensitivity	< .25 uv.	< .25 uv	< .25 uv.
Audio Output	.25 W	.25 W	.25 W

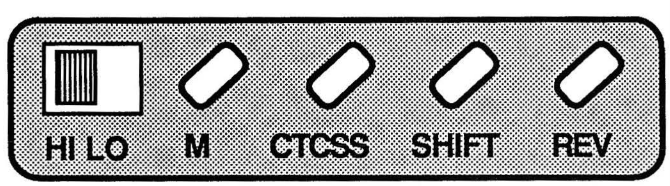
KENWOOD TH-X5A

KENWOOD TH-25A, TH-45A, TH-55AT





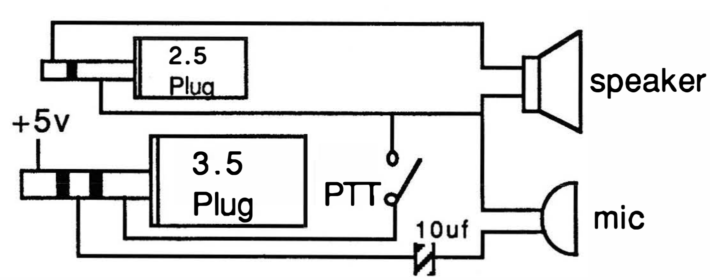




KENWOOD TH-X5

Key	FUNCTION
HI LO	Transmit power level switch. High power level is controlled by the voltage of the battery. Low power is approximately one tenth of high power.
M	Memory channel storage Key. Enter the desired Frequency, offset, tone, etc. Press the [M] key, and turn the frequency knob to select desired memory channel and press [MR] again. While in the memory mode, pressing the [M] key will transfer the meory into the VFO.
CTCSS	Press to turn on/off the CTCSS or PL decode mode. The optional TSU-6 is required. Hold the [CTCSS] key for longer than one second to select the desired subaudible tone. Press the [TONE] key to return to normal mode.
SHIFT	Press to select the desired transmit offset direction. Offsets cycle from simplex, minus and positive. Memory 13 and 14 can store "odd split" offsets. For odd split, store the receive frequency into memory 13 or 14 and then select the transmit frequency and store it in the same memory channel remembering to press the [PTT] key before pressing the [M] key the final time.
REV	Press the [REV] key to exchange the transmit and receive frequency while in the SHIFT/OFFSET mode. This will allow you to monitor a repeater input and transmit on its outputs.
TONE	Press to activate/deactivate the subaudible tone encoder (PL).
T.ALT	Press to activate/deactivate the Tone Alert function. Tone Alert will provide a audible alarm sound when someone transmits on the frequency you are monitoring.
MHz	Press to activate/deactivate the Megahertz tuning mode. Use the control knob to dial the desired MHz number.
VFO	Press to enter the VFO mode. Press and hold for longer than one second to scan the entire band . Turn the control knob counter-clockwise to change the direction of the scan. Press [VFO] again to stop scanning.
MR	Press to enter the Memory mode. Press and hold for longer than one second to scan all unlocked memory channels. Turn the control knob counter-clockwise to change the direction of the scan. Press [MR] again to stop scanning.

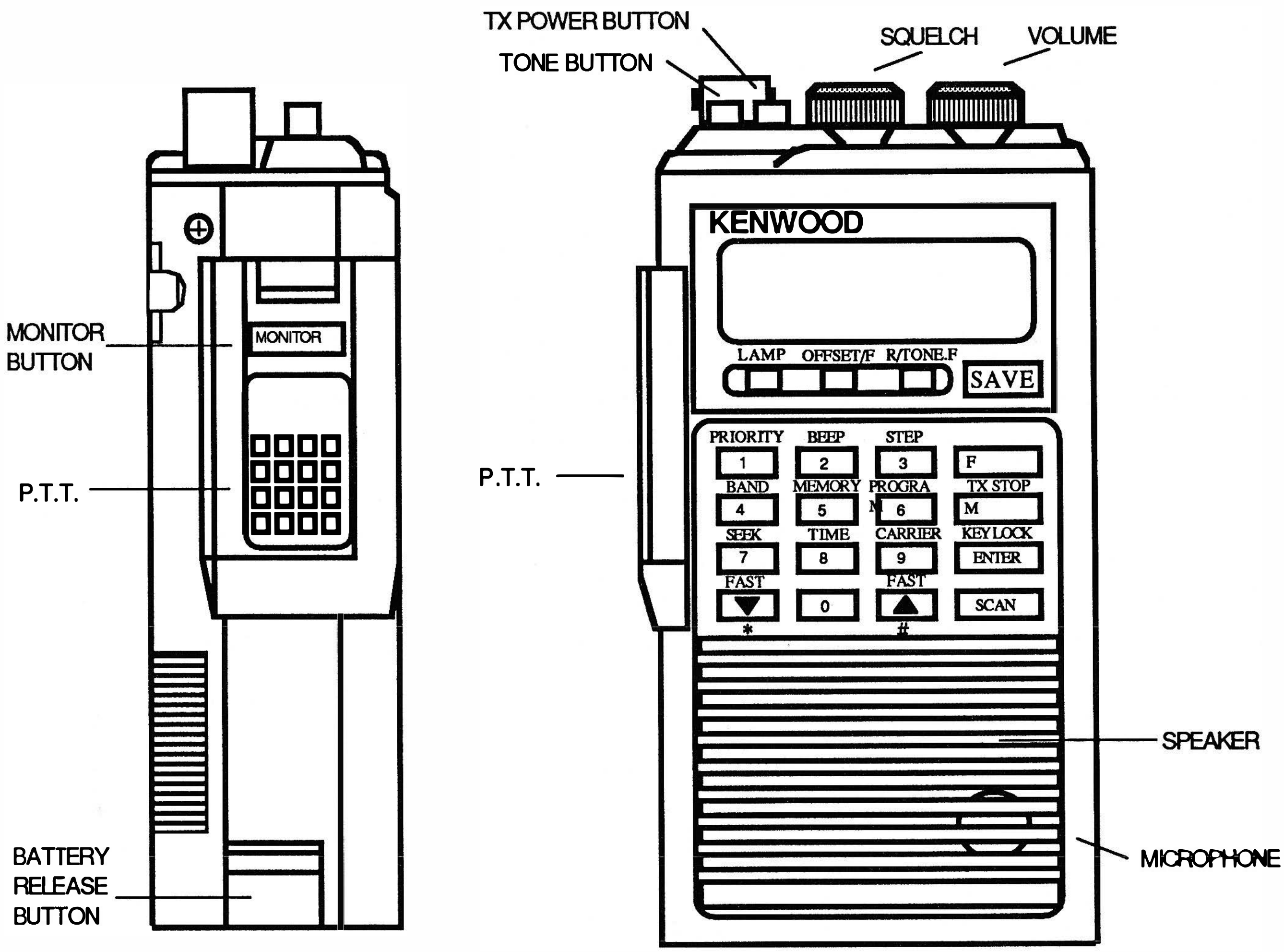
Desired Function	KENWOOD TH-X5 Keystrokes
Memory Storage	TUNING KNOB Select Frequency Offset etc. + M + TUNING KNOB Select Memory + MR
Storing an ODD-SPLIT Memory	TUNING KNOB Select Receive Frequency + Store in memory 13 or 14 + TUNING KNOB Select Transmit Frequency → M + PTT Push and hold down + MR
Memory Ch. Lockout	MR + TUNING KNOB Select Memory + M Hold for 2 seconds + MR
Memory CH. unlock	MR + M Hold for 2 seconds + TUNING KNOB Select Memory + MR
Battery Saver and Automatic Power off Activate/Deactivate	Power Volume Knob Turn power off + MR Press and hold + Power Volume Knob Turn power on The Hz dot will appear when the Battery saver function is off.
Step Selection	VFO + M + MHz TH-25 5/10 kHz · TH-45 25/5 kHz · TH-55 25/12.5 kHz
Microprocessor Initalization	M Press and hold + Power Volume Knob Turn power on

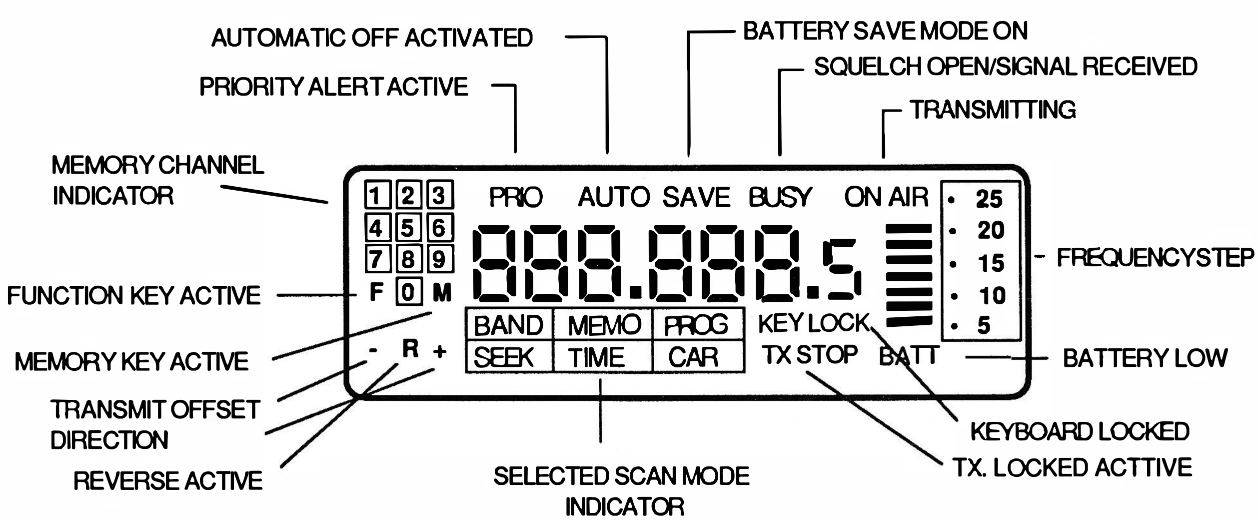


MEMORY #	FREQUENCY	OFFSET	PL TONE	OTHER
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
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27				
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29				
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32				
33				
34				
35				
36				
37				
38				
39				
40				

KENWOOD TH-X15

KENWOOD TH-215, TH-315, TH-415





Key	FUNCTION KENWOOD TH-X15
PRIORITY [ ]	Activate/Deactivate the Priority Watch mode. Once every 10 seconds Memory #1 will be checked for activity.
BEEP [ ]	Press after the [F] key to activate/Deactivate the audible beep sound when a key is pressed.
STEP [ ]	Press after the [F] key to increase the frequency step by 5 kHz.
BAND [ ]	Press after the [F] key to select the BAND SCAN mode. Press [SCAN] to start.
MEMORY [ ]	Press after the [F] key to select the MEMORY SCAN mode. Press [SCAN] to start.
PROGRAM [ ]	Press after the [F] key to select the PROGRAMMABLE BAND SCAN mode. Press [SCAN] to start.
SEEK [ ]	Press after the [F] key to select the Scan mode where the scan will stop on a busy channel and will not resume until [SCAN] is pressed again.
TIME [ ]	Press after the [F] key to select Scan mode where the scan will stop on a busy channel and will automatically resume scanning after 5 seconds.
CARRIER [ ]	Press after the [F] key to select Scan mode where the scan will stop on a busy channel and will automatically resume scanning 2 seconds after the signal stops.
[SCAN]	Press to activate/deactivate the SCANNING.
FAST [▼]	Press to decrease the frequency down by one STEP. (see [STEP] key). Hold key down to continuously STEP down. Press after the [F] key to rapidly STEP down.
FAST [▲]	Press to increase the frequency up by one STEP. (see [STEP] key). Hold key down to continuously STEP up. Press after the [F] key to rapidly STEP up.
[F]	Press to select the alternate (FUNCTIONS) of the keyboard keys. [F] will select the function printed above the key.
TX STOP [M]	Press to store the VFO into a MEMORY channel. Press the [M] key and then the number key [1] or [2], etc. to select that memory channel. Press after the [F] key to lockout the P.T.T. key. Press again to reactivate the P.T.T.
KEY LOCK [ENTER]	Press to enter a frequency into the VFO. Press [ENTER] then the number keys of the desired frequencies. All digits must be entered. Press after the [F] key to Lock/Unlock the keyboard.

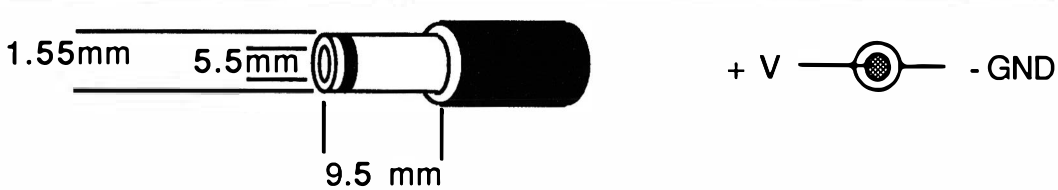
Key	FUNCTION
LAMP	Press to activate/deactivate the LCD display lamp.
OFFSET/F	Press to alternate between the available transmit offset directions. The cycle is positive (+), negitive (-) and simplex offsets. Press after the [F] key to change the offset value. The [UP] and [DOWN] arrow keys will step the offset value by 100 kHz. Press [ENTER] to store the value. NOTE: Memory channel 0 can store an ODD SPLIT frequency.
R/TONE.F	Press to reverse the transmit and receive frequencies. Press after the [F] key to change the sub-audible tone frequency. The [UP] and [DOWN] arrow keys will step the tone frequency. Press [ENTER] to store the value. NOTE: depress the [TONE] key on the top of the radio to activate the sub-audible tone.
SAVE	Press to select the power save modes SAVE mode: Power save starts 2 seconds after the receive signal stops. AUTO SAVE mode : Power save start 1 minute after the last key press when no signal is present. Press after the [F] key to change the ratio of the power save on/off feature. The [UP] and [DOWN] arrow keys will step the ratio. 1:1 = 3 tenths of a second on 3 tenths of a second off. 1:2 =3 tenths of a second on 6 tenths (3/5) of a second off. Press [ENTER] to store the value.
0	Press after the [F] key to LOCK/UNLOCK a memory channel. Locking out a memory channel will cause it to be skipped during memory scanning.

SPECIAL MEMORY CHANNEL ASSIGNMENTS

Memory 0	Odd Split Repeater frequencies
Memory 1	Priority Alert channel
Memory 8	Lower limit for programmable band scan
Memory 9	Upper limit for programmable band scan.

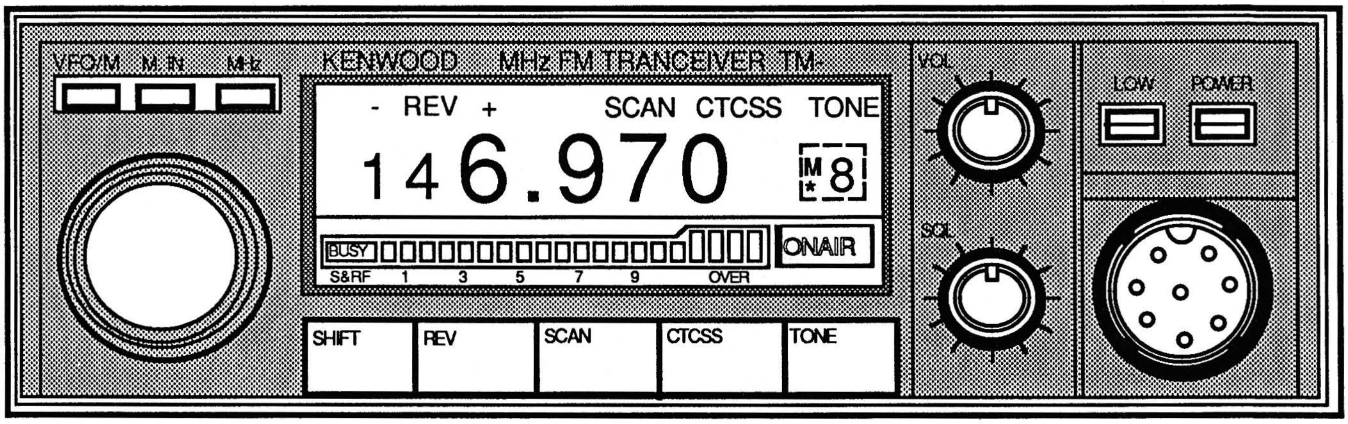
KENWOOD TH-X15

Desired Function	Keystrokes
Memory Storage	KEY LOCK ENTER + 1 2 3 4 5 6 7 8 9 0 Select Frequency Offset etc. + TX STOP M → 1 2 3 4 5 6 7 8 9 0 Select Desired Memory Channel
Storing an ODD-SPLIT Memory. Channel 0 only.	KEY LOCK ENTER + 1 2 3 4 5 6 7 8 9 0 Select RECEIVE Frequency + TX STOP M → 0 + KEY LOCK ENTER + 1 2 3 4 5 6 7 8 9 0 Select TRANSMIT Frequency → TX STOP M + PTT (Push and hold down) + 0
Memory Channel LOCKOUT/UNLOCK	1 2 3 4 5 6 7 8 9 0 Select Desired Memory Channel + F + 0
Clear a Memory Channel	TX STOP M + F + 1 2 3 4 5 6 7 8 9 0 Select Desired Memory Channel
Microprocessor Initialization	F Press and Hold + KEY LOCK ENTER Press and Hold + Power Volume Knob Turn power on



KENWOOD TM - X21A SERIES

KENWOOD TM-221A, TM-321A, TM-421A and TM-521A



Key Press Functions

VFO/M Switch between VFO and Memory modes. In the Memory mode, the Memory channel indicator will turn on.

M. IN In VFO mode it stores the VFO frequency into a memory channel. Tune the desired Frequency, Repeater Shift and PL tone. Press the [M.IN] Key and release, select the desired Memory channel and then press the [M.IN] Key again. All this must be done within 5 seconds. Memories C & D are used to store "ODD SPLIT" repeater offsets. Select Memory C or D and then in the VFO mode, dial the desired Receive frequency and press the [M.IN] key. Now dial the desired Transmit Frequency and press the [M.IN] key again.

MHz In VFO mode, the Tuning control will change by Megahertz. The KHz numbers will disappear. Press the key again to stop. (Automatic reset after 5 seconds).

SHIFT In VFO and MEMORY modes, the transmitter offset will be changed from Simplex to a minus (-) or positive (+) offset. Changes in the Memory mode will not be retained after leaving the selected memory channel.
Odd Split offsets can only be placed in Memorys C & D.

REV In VFO and MEMORY mode, the radio will reverse the Transmit/Receive Frequencies while in the [SHIFT]/Repeater mode. The display will shown "REV" when in this mode.

SCAN This key will start and stop the Scanning freture of the radio. The display will show "SCAN" when this mode is activated. The scanning will stop for 5 seconds when a signal is detected. The direction on the scanning is controlled by the direction last used by the tuning knob or microphone UP/DOWN buttons.
In VFO Mode, use Memory A to hold the lower limit and Memory B to hold the upper limit. IF Memory A if higher than Memory B then the scan will proceed over the entire tuning range.
In MEMORY mode, all unlocked memories will be scanned. To Scan lock/unlock a memory channel, select the desired memory channel and press the [M.IN] key and then press the [SCAN] key. A star [*] will appear next to the Channel number when the channel is in scan lockout.

KENWOOD TM-221A, TM-321A, TM-421A and TM-521A

[CTCSS] Requires the optional CTCSS board. When installed, this key will place the radio in a mode that will require the incomming signal to be encoded with the proper PL subaudable tone. The required tone is the same selected by the [TONE] key. Note: not all repeater encode a PL tone.

[TONE] In Memory and VFO mode, this key will cause the Transmitted signal to be encoded with a PL subaudable tone. Many repeaters require a PL tone to activate the repeater. This tone can also be used with another radio that has the CTCSS feature.
In VFO mode, the desired PL tone is selected by first pressing the [M.IN] key and then the [TONE] key. Use the Tuning knpb to select the desired PL tone. Then press the [TONE] key again the return to normal mode.

[LOW] This key is used to select the desired transmitter output power level. See Power level chart. The Signal/RF indicator will display the selected power level when the PTT switch is pressed.. High power will show all bars lighted. Low power will light 3-4 bars. In low power, modulation will also be shown on the Signal/RF meter.

[POWER] This key turns the radio on and off.

SPECIFICATIONS

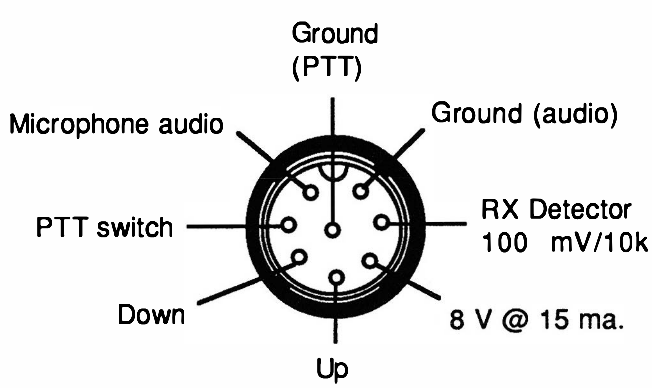
	TM-221A	TM-321	TM-421	TM-521
Freq. Range In MHz	144-148	220-225	440-450	
Current drain TX/RX	9.5 / .4	6.5/ .4	8.5/ .4	8.5/ .4
Output Power In Watts	5 / 45	5 / 25	5 / 35	1/ 10
Sensitivity	< .16 uv.	< .16 uv.	< .16 uv.	< .16 uv.
Audio Output Watts @ 8 Ohms	2	2	2	2
Size W/H/D In Millimeters	141/42/193	141/42/193	141/42/154	141/42/

ADJUSTMENTS

Located under top cover

VR3 - Microphone gain

VR7 - Low power output



STORE A FREQUENCY IN MEMORY
(only operates in VFO mode)

TUNING KNOB
Select Frequency

M. IN

TUNING KNOB
Select Memory

M. IN

STORE A ODD SPLIT REPEATER IN MEMORY

TUNING KNOB
Select Receive Frequency

M. IN

TUNING KNOB
Select Memory C or D

M. IN

TUNING KNOB
Select Transmit Frequency

M. IN

TRANSFER A MEMORY INTO THE VFO
(only operates in Memory mode)

M. IN

VFO/M

CHANGE THE TUNING STEP
(only operates in VFO mode)

M. IN

REV

TUNING KNOB

REV

SELECT A PL TONE

M. IN

TONE

TUNING KNOB
Select Tone

TONE

TURN ON/OFF THE CONFIRMATION TONES

M. IN

CTCSS

MEMORY LOCKOUT (SCAN)

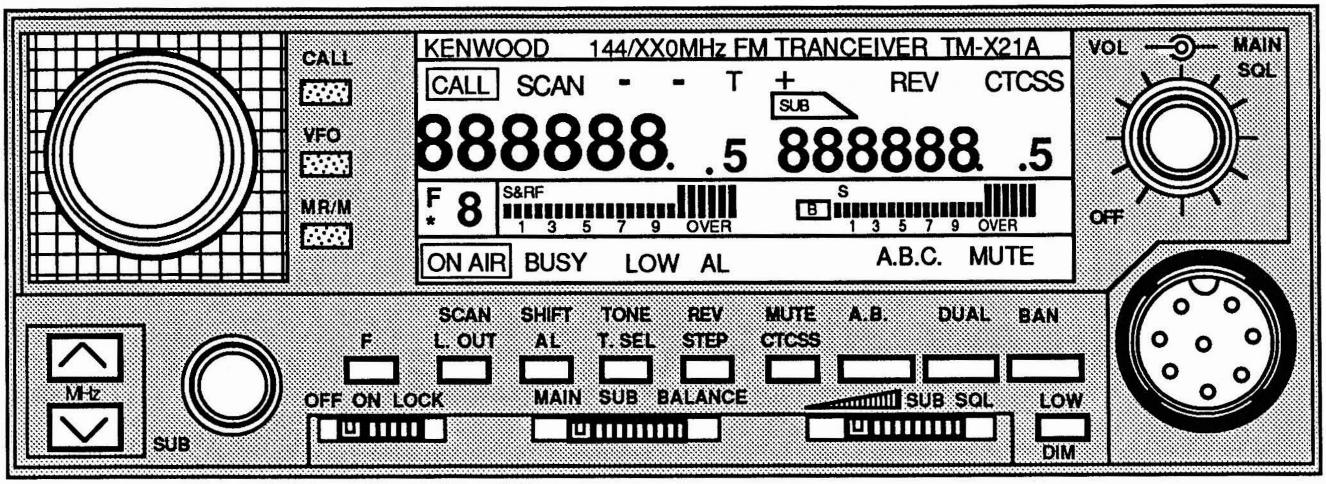
TUNING KNOB
Select Memory

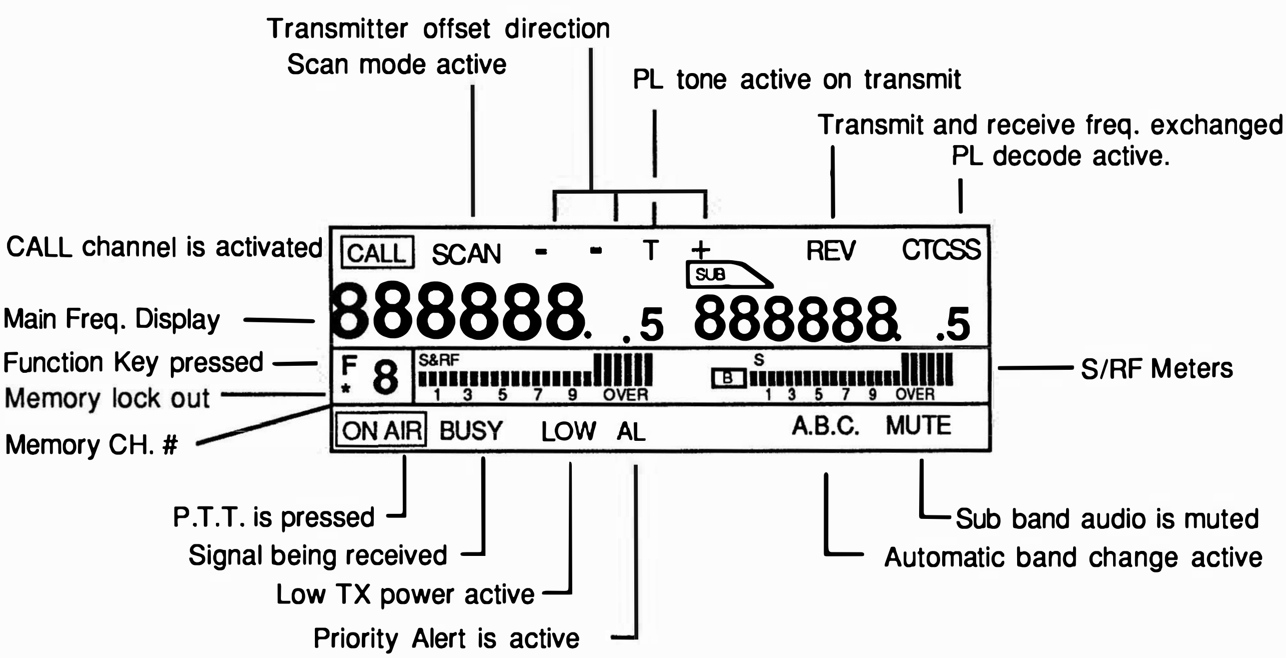
M. IN

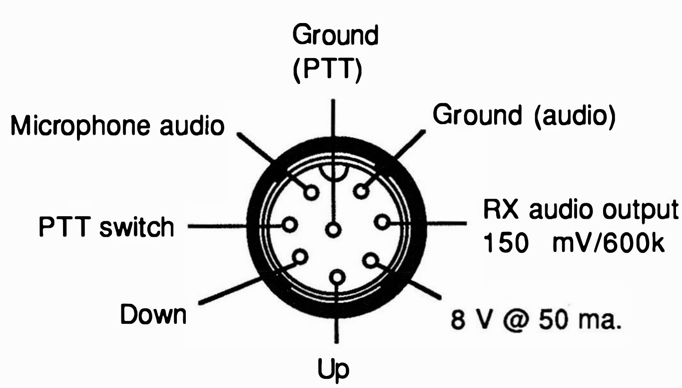
SCAN

KENWOOD TM - X21A SERIES

KENWOOD TM-621, TM-721







TM-621 or TM-721 Key Press Commands

Key	FUNCTION
F	Function key - Press and release this key to select the alternative option of another key.
SCAN L. OUT	Press to activate/deactivate the scan mode. Press after the [F] key to Lock out a memory channel during the memory channel scan mode.
SHIFT AL	Press to select the desired transmitter offset. Offsets will alternate from - to + to simplex. The display will show the - or + sysbols. Simplex mode is not displayed. Press after the [F] key to select the Alert mode. Memory channel 1 will be scanned every 5 seconds. If a signal is detected, a beep will sound.
TONE T. SEL	Press to activate the subaudible tone (PL) encoder. Press after the [F] key to select the desired subaudible tone. Use the tuning knob to dial the desired tone.
REV STEP	Press to reverse the transmit/receive frequency while in the shift mode. Press after the [F] key to select the desired channel stepping. Use the tuning knob to select the desired step.
MUTE CTCSS	Press to mute the sub band. Press after the [F] key to select CTCSS mode. (optional TSU-6 is required). CTCSS will require the incomming signal to be encoded with a subaudible tone. (the same one selected with the [T.SEL] key. Only the SUB-BAND can be used with the CTCSS mode.
A.B.C.	This key will activate the automatic band control mode. When a signal is detected on the sub band, the sub band will be transfered to the main band.
DUAL	Press to turn on/off the sub band.
BAND	This key will change the band displayed on the main display. The sub display will display the other band.
LOW DIM	Press to select the RF transmit power level. Press after the [F] key to change the display lighting level.
MHz (up/down)	This switch is used to change frequency by one MegaHertz. The up key will increase the frequency by one Megahertz. The down key will decrease the frequency by one Megahetrz.
SUB	This control knob is simular to the main tuning knob, with the exception that it controls the SUB-BAND only. In VFO mode , the Frequency can be changes. In Memory mode, the memory channel can be changed.

TM-621 or TM-721

Key	FUNCTION
CALL	This key is used to activate/deactivate the CALL Channel.
VFO	This key is used to enter the VFO mode. Hold this key for longer that one second and the VFO scan will start. Press after the [F] key to transfer a memory into the VFO.
MR / M	This key is used to enter the Memory mode. Press after the [F] key to store the VFO into a memory channel.
OFF ON LOCK	This switch will deactivate all keyboard functions except PTT.
MAIN SUB BALANCE	This switch controls the amount of audio volume from each band. Audio is balanced be sliding to the left to increase Main level while decreasing the Sub level. Slide to the right to favor the sub band while decreasing the main level.
SUB SQL	This switch controls the squelch of the sub band.

Desired Function	Keystrokes
Memory Storage	TUNING KNOB Select Frequency Offset etc. + F + TUNING KNOB Select Memory + MR M
Storing an ODD-SPLIT Memory	TUNING KNOB Select Receive Frequency & Tone + F + TUNING KNOB Select Memory C or D + MR M → TUNING KNOB Select Transmit Frequency + MR M
CALL channel memory	TUNING KNOB Select Frequency Offset etc. + F + CALL
Frequency Step	VFO + F + REV STEP + TUNING KNOB Select Step

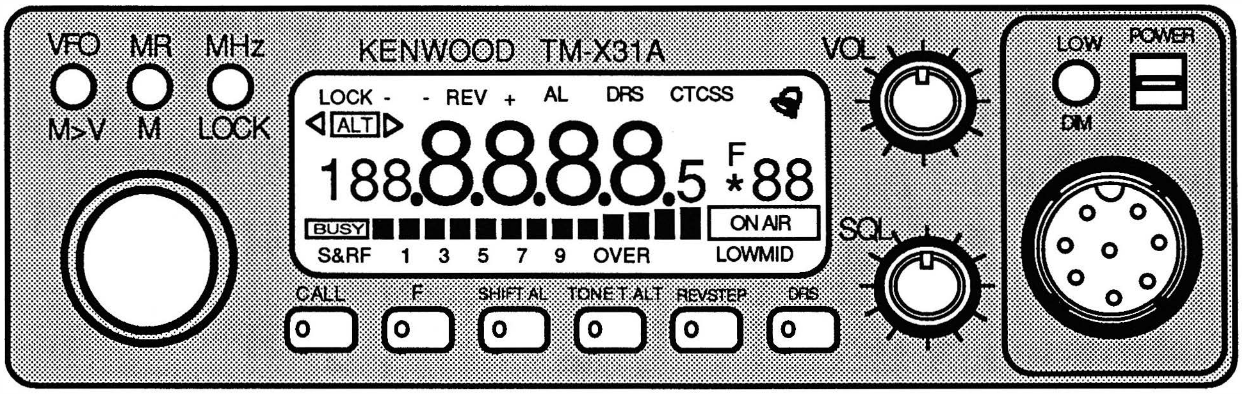
TM-621 or TM-721

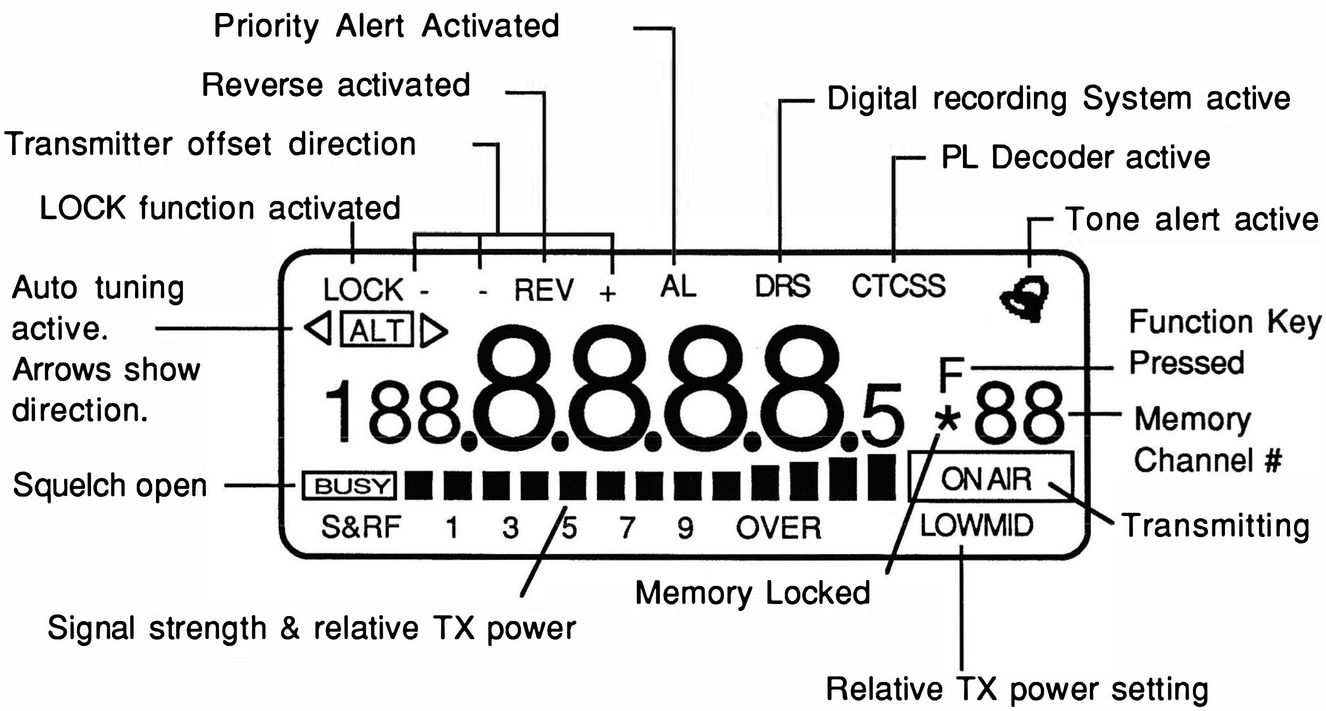
Desired Function	Keystrokes
Sub-Audible Tone	F + TONE T. SEL + TUNING KNOB Select Tone + TONE T. SEL
Programmable Band Scan	TUNING KNOB Select Lower Frequency + Store in memory Ch. A + TUNING KNOB Select Upper Frequency → Store in memory Ch. B + VFO + TUNING KNOB Select a Frequency within the Range. → SCAN L. OUT
Priority Alert	Store Frequency in Memory 1 + F + SHIFT AL Press again to cancel
Memory Channel Lockout	MR M + TUNING KNOB Select Memory Channel + F + SCAN L. OUT Press again to cancel
Transfer a Memory into the VFO	MR M + TUNING KNOB Select Memory Channel + F + VFO

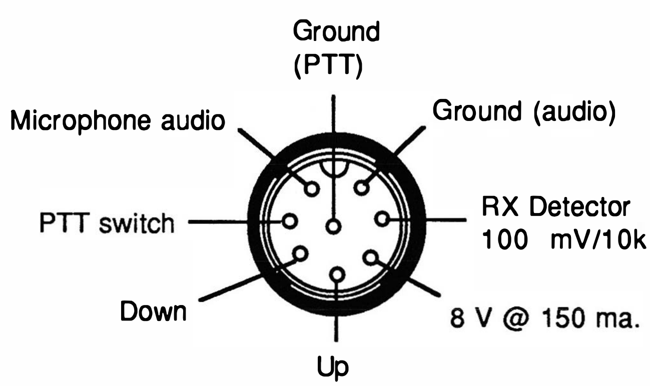
9.5 Amps required @ 13.8 VDC

KENWOOD TM - X31A SERIES

KENWOOD TM-231A, TM-331A, TM-431A and TM-531A







Key	FUNCTION
VFO O M>V	Press to enter the VFO mode. Pressed for longer than1 second will start the VFO scan. Pressed after the [F] key will copy the current memory channel into the VFO. Pressed after holding the [F] key for 2 seconds will toggle between TIME OPERATED SCAN and CARRIER OPERATED SCAN.
MR O M	Press to enter the MEMORY mode. Pressed for longer than 1 seconds will start Memory scan. Pressed after the [F] key will copy the current VFO information into a memory channel. Enter Frequency, etc., press [F], select memory channel, press [MR]. Pressed after holding the [F] key for 2 seconds (while in the Memory mode) will toggle the MEMORY LOCKOUT. (Memory lockout will prevent a memroy from being scanned during memory scan.
MHz O LOCK	Press to switch frequency step to 1 MegaHertz. Pressed after pressing the [F] key will toggle the KEYBOARD LOCK. During keyboard lock, only the P.T.T. key will operate.
F [O]	Press momentarily to select the alternate keyboard functions. The "F" sysbol on the display will turn on. Press for 2 seconds to select secondary alternate functions. The "F" sysbol will flash.
CALL [O]	Press to activate the CALL function. Pressed after the [F] key will copy the current VFO information into the CALL CHANNEL. Pressed after holding down the [F] key for longer than 2 seconds will copy the current VFO frequency into the Lower VFO limit.
SHIFT AL [O]	Press to select the desired transmltter offset. +(plus), - (minus) or Simplex. Pressed after the [F] key will activate the Priority alert function. Memory #1 will be scanned every 5 seconds. A beep will sound if there is activity on memory #1. Pressed after holding down the [F] key for longer than 2 seconds will copy the current VFO frequency into the Upper VFO limit.
TONE T.ALT [O]	Press to toggle the transmit sub-audible tone (PL) on, CTCSS and off. The "T" sysbol will appear on the display when the function is on. Pressed after the [F] key will activate the TONE ALERT function. Tone alert will cause a series of beep sounds when a signal is present. Pressed after holding down the [F] key for longer than 2 seconds will allow you to select the desired sub-audible (PL) tone. Use the Control knob to select the desired pl frequency. Press [TONE] again to complete the function
REVSTEP [O]	Press to REVERSE the Transmit and receive frequencies. The Duplex mode must be active. Pressed after the [F] key will allow you to selectthe desired FREQUENCY STEP. Use the Control knob to select the desired STEP. Pressed after holding down the [F] key for longer than 2 seconds will toggle the BEEP function on and off.

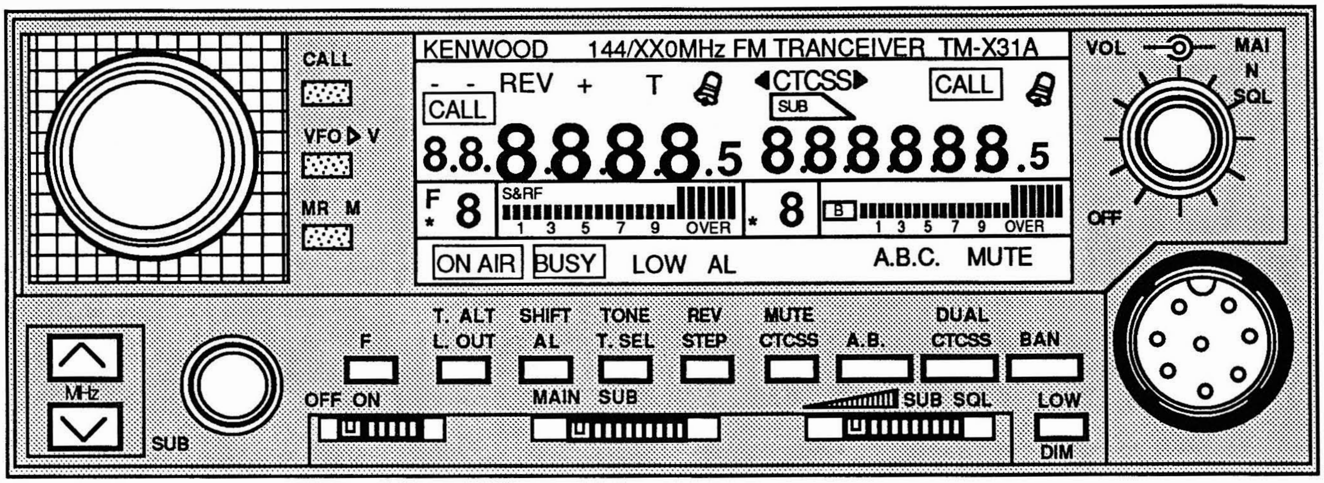
Key	FUNCTION
DRS [O]	Press to toggle the DIGITAL RECORDING SYSTEM on and off. The optional DRU-1 is required. Pressed after the [F] key will cause the ALT function of the TM-531 to activate.
LOW O DIM	Press to toggle between the 3 transmit power levels (HI, MED, or LOW). Pressed after the [F] key toggle the display brightness.

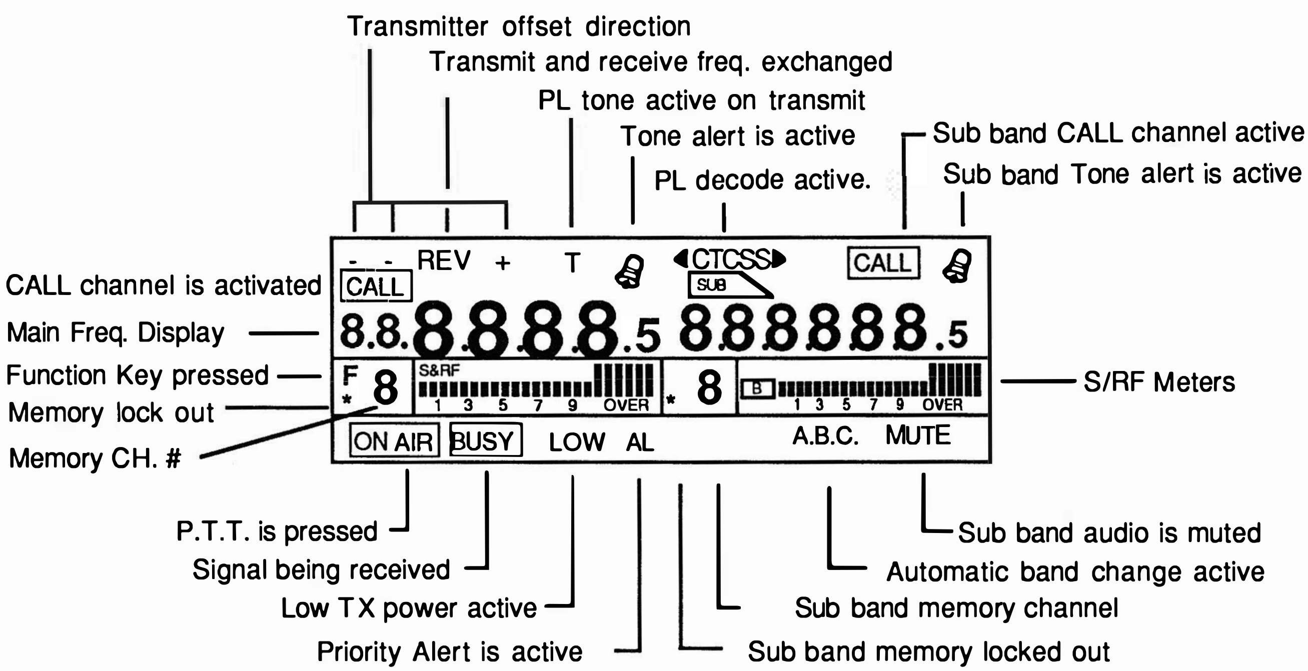
Desired Function	Keystrokes
Memory Storage	TUNING KNOB Select Frequency Offset etc. + F [O] + TUNING KNOB Select Memory + MR O M
Storing an ODD-SPLIT Memory Memorys 17, 18, 19 or 20	TUNING KNOB Select Receive Frequency & Tone + F [O] + TUNING KNOB Select Memory 17,18 19 or 20 + MR O M → TUNING KNOB Select Transmit Frequency + MR O M
CALL channel memory	TUNING KNOB Select Frequency Offset etc. + F [O] + CALL [O]
Frequency Step	VFO O M>V + F [O] Hold for 2 seconds + REVSTEP [O] + TUNING KNOB Select Step + F [O]
Sub-Audible Tone Selection	F [O] Hold for 2 seconds + TONE T.ALT [O] + TUNING KNOB Select Tone + TONE T.ALT [O] Press until "T" appears on display

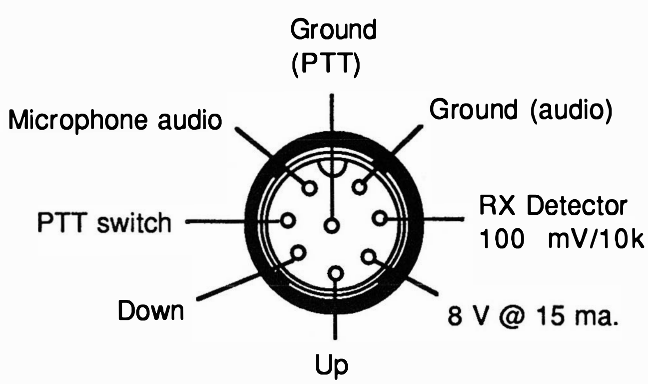
Desired Function	Keystrokes
Programmable Band Scan Note: The Up and down arrow key on the mic will change the direction of the scan. The VFO must have a frequency within the band scan limits to function. See [VFO] Key.	TUNING KNOB Select Lower Frequency + Store in memory Ch. 15 + TUNING KNOB Select Upper Frequency → Store in memory Ch. 16 + VFO M>V Press for 2 seconds
Memory channel Scan	MR M Press for 2 seconds
Priority Alert	Store Frequency in Memory 1 + F + SHIFT AL Press again to cancel
Memory Channel Lockout/Unlock	MR M + TUNING KNOB Select Memory Channel + F Hold for 2 seconds + MR M
Transfer a Memory into the VFO	MR M + TUNING KNOB Select Memory Channel + F + VFO M>V
ALT / Automatic Frequency Control TM-531 only. ALT arrows on the display will show the drift.	F + DRS

KENWOOD TM - X31A SERIES

KENWOOD TM-631, TM-731







TM-631 or TM-731 Key Press Commands

Key	FUNCTION
F	Function key - Press and release this key to select the alternative option of another key.
T. ALT L. OUT	Press to select the tone alert mode. Press again to turn off tone alert. The Bell sysbol will appear on the display when tone alert mode is on. Press after the [F] key to Lock out a memory channel during the memory channel scan mode.
SHIFT AL	Press to select the desired transmitter offset. Offsets will alternate from - to + to simplex. The display will show the - or + sysbols. Simplex mode is not displayed. Press after the [F] key to select the Alert mode. Memory channel 1 will be scanned every 5 seconds. If a signal is detected, a beep will sound.
TONE T. SEL	Press to activate the subaudible tone (PL) encoder. Press after the [F] key to select the desired subaudible tone. Use the tuning knob to dial the desired tone.
REV STEP	Press to reverse the transmit/receive frequency while in the shift mode. Press after the [F] key to select the desired channel stepping. Use the tuning knob to select the desired step.
MUTE CTCSS	Press to mute the sub band. Press after the [F] key to select CTCSS mode. (optional TSU-6 is required). CTCSS will require the incomming signal to be incoded with a subaudible tone. (the same one selected with the [T.SEL] key.
A.B.C.	This key will activate the automatic band control mode. When a signal is detected on the sub band, the sub band will be transfered to the main band.
DUAL CTCSS SEL	Press to turn off the sub band. Press after the [F] key to select VHF & UHF CTCSS mode. (optional TSU-6 is required). CTCSS will require the incomming signal to be incoded with a subaudible tone. (the same one selected with the [T.SEL] key.
BAND	This key will change the band displaied on the main display. The sub display will display the other band.
LOW DIM	Press to select the RF transmit power level. Press after the [F] key to change the display lighting level.
MHz	This switch is used to change frequency by MegaHertz. The up key will increase the frequency by one Megahertz. The down key will decrease the frequency by one Megahetrz.
SUB	This control knob is simular to the main tuning knob, with the exception that it controls the SUB-BAND only. In VFO mode , the Frequency can be changes. In Memory mode, the memory channel can be changed.

TM-631 or TM-731

Key	FUNCTION
CALL	This key is used to activate/deactivate the CALL Channel.
VFO M ▷V	This key is used to enter the VFO mode. Hold this key for longer that one second and the VFO scan will start. Press after the [F] key to transfer a memory into the VFO.
MR M	This key is used to enter the Memory mode. Hold this key longer than one second to start the memory scan. Press after the [F] key to store the VFO into a memory channel.
OFF ON LOCK	This switch will deactivate all keyboard functions except PTT.
MAIN SUB BAL	This switch controls the amount of audio volume from each band. Audio is balanced be sliding to the left to increase Main level while decreasing Sub level. Slide to the right to favor the sub band while decreasing main level.
SUB SQL	This switch controls the squelch of the sub band.

Desired Function	Keystrokes
Memory Storage	TUNING KNOB Select Frequency Offset etc. + F + TUNING KNOB Select Memory + MR M
Storing an ODD-SPLIT Memory	TUNING KNOB Select Receive Frequency & Tone + F + TUNING KNOB Select Memory C or D + MR M → TUNING KNOB Select Transmit Frequency + MR M
CALL channel memory	TUNING KNOB Select Frequency Offset etc. + F + CALL
Frequency Step	VFO M ▷V + F + REV STEP + TUNING KNOB Select Step

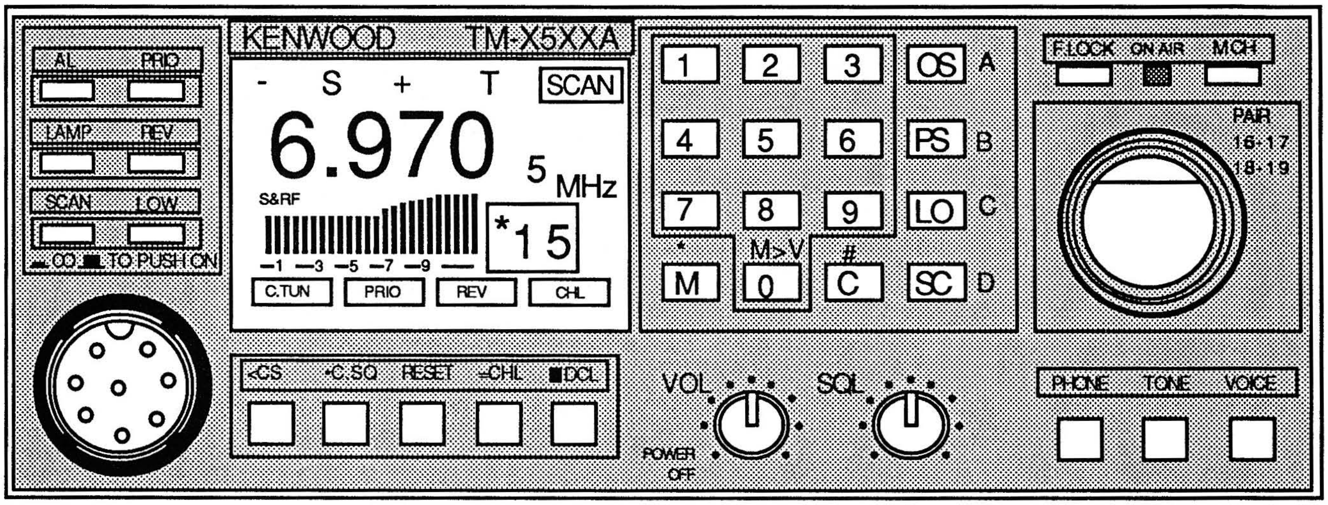
TM-631 or TM-731

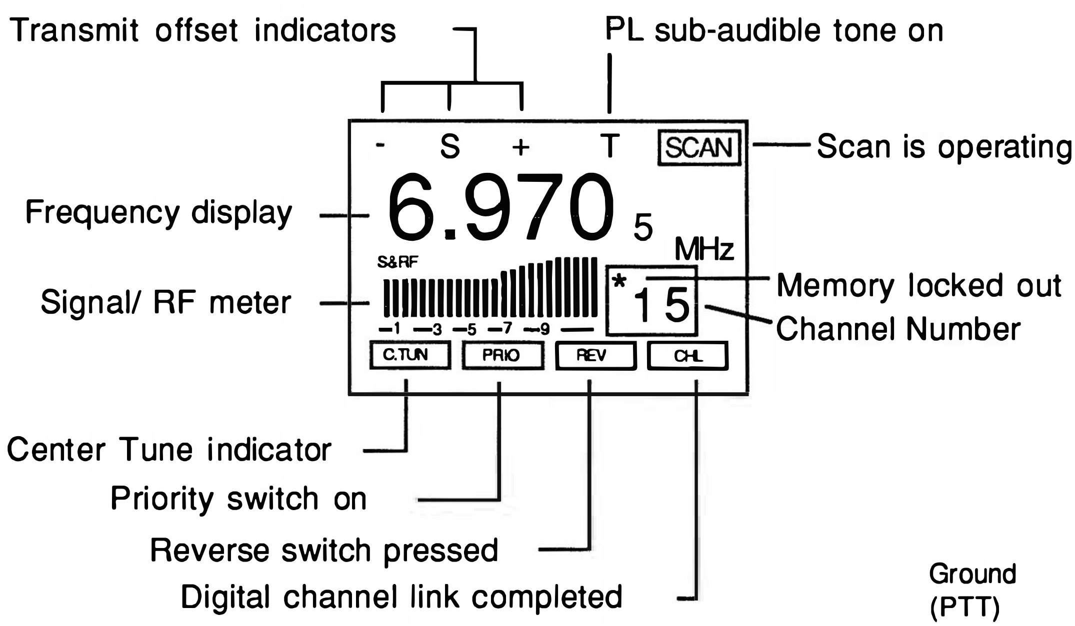
Desired Function	Keystrokes
Sub-Audible Tone	F + TONE T. SEL + TUNING KNOB Select Tone + TONE T. SEL
Programmable Band Scan	TUNING KNOB Select Lower Frequency + Store in memory Ch. A + TUNING KNOB Select Upper Frequency → Store in memory Ch. B + VFO M ▷V + TUNING KNOB Select a Frequency within the Range. → VFO M ▷V Press and hold for 2 seconds
Priority Alert	Store Frequency in Memory 1 + F + SHIFT AL Press again to cancel
Memory Channel Lockout	MR M + TUNING KNOB Select Memory Channel + F + T. ALT L. OUT Press again to cancel
Transfer a Memory into the VFO	MR M + TUNING KNOB Select Memory Channel + F + VFO M ▷V

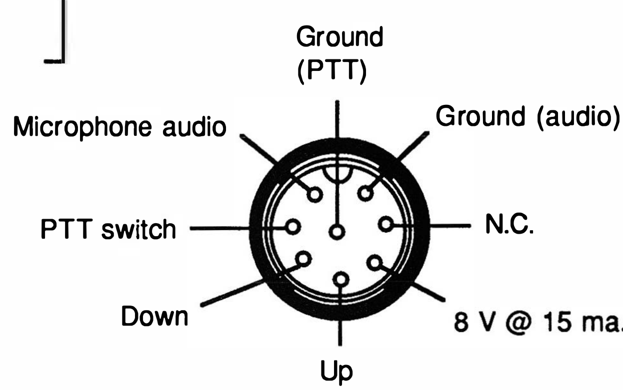
11 Amps required @ 13.8 VDC

KENWOOD TM-x5x0A

KENWOOD TM-2530, TM-2550, TM-2570, TM-3530







Key	FUNCTION **TM-x5x0**
AL	Press to check the spscified Priority channel. Depressing the switch will cause the Priority channel to be checked every 6 seconds. A "dual-beep" sounds when ever the Priority channel is in use.
LAMP	Press to light up the keyboard and switches
SCAN	Press to select the scan mode type. When the switch is in the not depress position, TO (Time Operated) scan is selected. Scan will stop for 5 seconds and then continue When the switch is depressed, CO (Carrier Operated) scan is selected. San will stop on a channel with a signal and will not proceed until the signal stops.
PRIO	Press to select the priority channel. The Priority channel indicator on the LCD will light.
REV	Press to reverse/exchange the Transmit and Receive frequencies. Requires the Duplex mode to be activated.
LOW	Press to select Low power transmit. Low power is approx 5 watts.
F.LOCK	Press to lock out frequency changes. The keyboard and up/down key will not operate.
M CH	Press to alternate between the Memory mode and the VFO (keyboard mode). The Memory channel number will light when in the memory mode.
[OS]	Press to alternate the transmit duplex offset direction. Options are Simplex, Plus (+) and Minus (-) offsets. The LCD display will reflect the selected mode.
[PS]	Press to assign the current memory channel to Priority status. The [PRIO] key must me depressed.
[LO]	Press to Lock out/Unlock a memory channel. Locking out a memory prevents it from being checked during Scanning. The "*" will appear next to the memory channel when it is locked out.
[SC]	Press to start the SCAN mode.
* [M]	Press to store the selected frequency and offset into the currently selected memory channel.
# [C]	Press to clear any keyboard entry. The old frequency will return.
PHONE	Press to select a telephone number memory location.
TONE	Press to select the desired PL sub-audible tone frequency. Tune the control knob to view the available tone frequencies. Press the [M] key to store it in the current memory location.
VOICE	Press to force the optional VS-1 board to audibly read the Frequency, PL tone etc.

Key	FUNCTION **TM-x5x0**
	These key make use of the Kenwood DCL (digital channel link) technology. No other manufactures made use of the technology and Kenwood discontinued using it in all their new radios.
<CS [ ]	Press to program the digital code and call sign. The optional MU-1 is required.
•C.SQ [ ]	Press to toggle the code squelch function on and off. The optional MU-1 is required.
RESET [ ]	Press to reset the channel linkage operation. The optional MU-1 is required.
=CHL [ ]	Press this ley to cause channel linkage. The optional MU-1 is required.
■DCL [ ]	Press to toggle the SCL system on and off. The optional MU-1 is required.

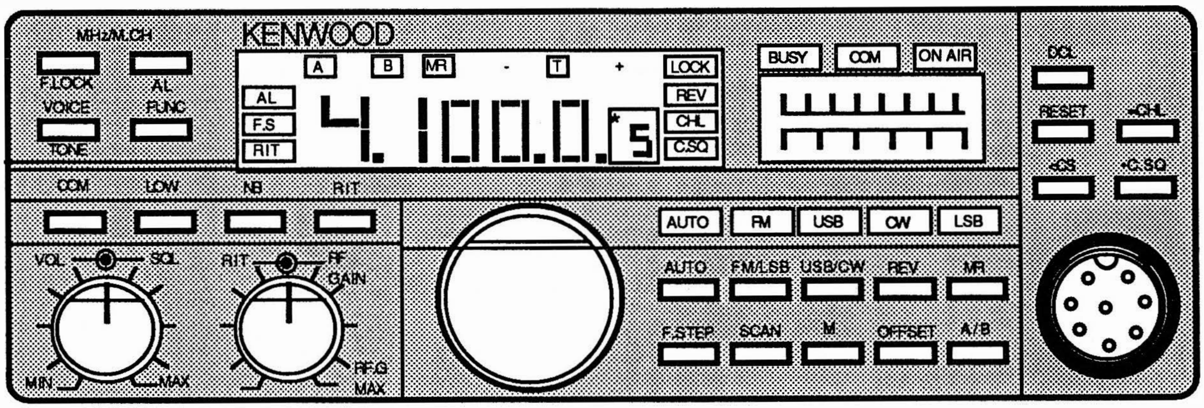
Desired Function	Keystrokes
Frequency and offset Entry	[1][2][3] [4][5][6] [7][8][9] [0] Select Frequency + [OS] + TUNING KNOB Select Offset + * [M]
Memory Storage	Enter Frequency & Offset + TUNING KNOB Select Memory + * [M]
Storing a PL tone in a memory	Store Frequency Offset in a memory + TONE [ ] + TUNING KNOB Select Tone + * [M] If no tone is desired press [C] during the tone selection step
Storing an ODD-SPLIT Memory Two pairs of channels are used for Odd-Split storage. Channels 16 & 17 Channels 18 & 19	Store Receive Frequency in memory 16 + Store Transmit Frequency & Tone in memory 17

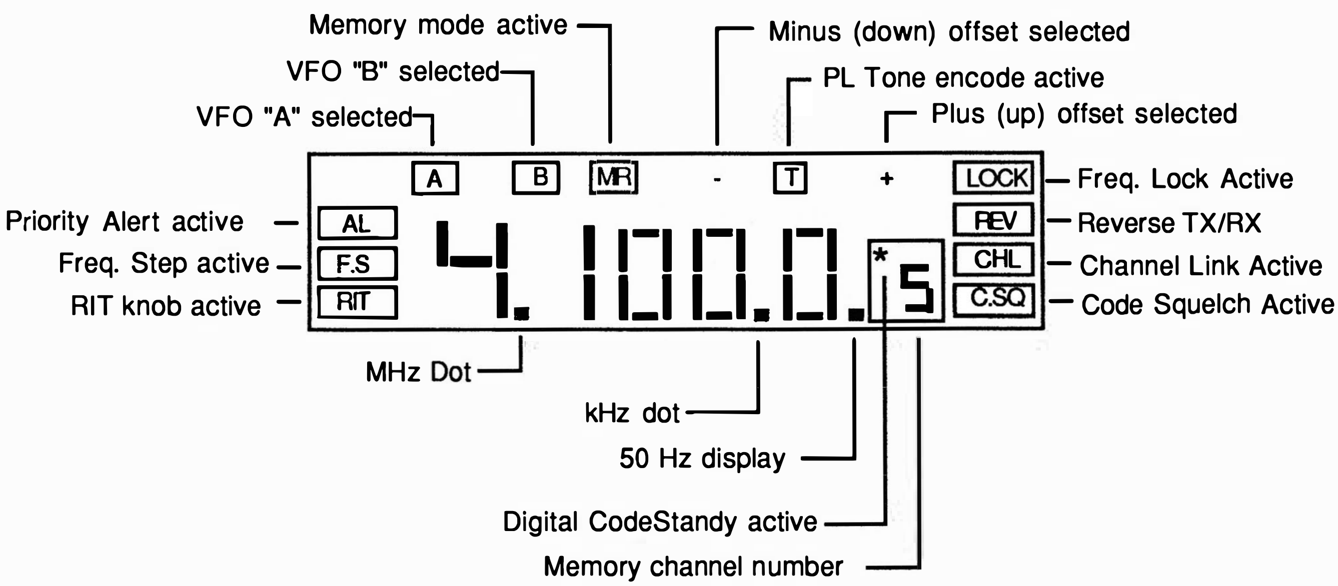
TM-x5x0

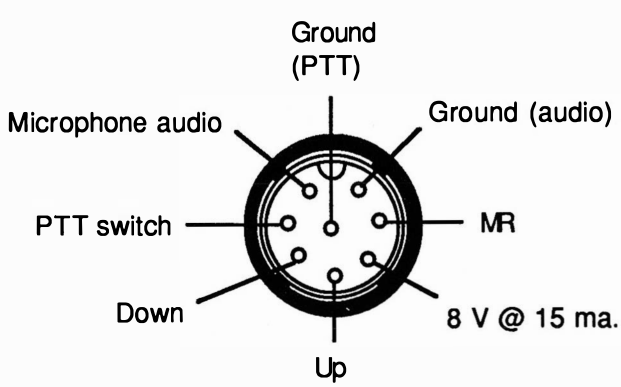
Desired Function	Keystrokes
Automatic Telephone Number entry	PHONE + TUNING KNOB Select Telephone Memory # (1-15) + PS + 1 2 3 4 5 6 7 8 9 0 Enter 7 digit Telephone Number → PS Press to review Telephone Number. Press [SC] to store a pause or a blank in the telephone number
Automatic Telephone Number entry	PHONE + TUNING KNOB Select Telephone Memory # (1-15) + Press P.T.T. + PHONE
Selecting a Priority Channel	AL + TUNING KNOB Select Memory Channel + PS
Programmable Band Scan	1 2 3 4 5 6 7 8 9 0 Enter Lower Frequency + Store in memory # d + 1 2 3 4 5 6 7 8 9 0 Enter Upper Frequency → Store in memory # U + SCAN Select Programmable Band scan Mode + Select VFO Mode → SC Start Scanning!!

KENWOOD TR-x51A

TR-751 & TR-851



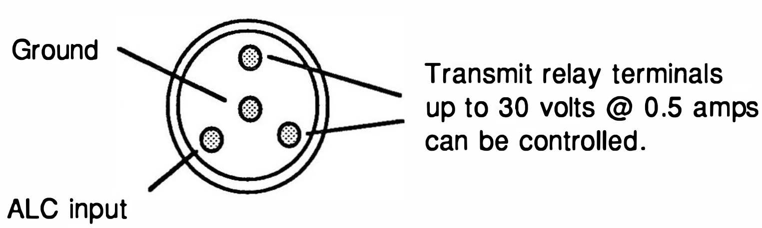




Key	FUNCTION
AUTO	Press to select the AUTOmatic MODE. In the automatic mode, the proper mode (FM, USB, etc) will be selected using the ARRL band plan.
FM/LSB	Press to toggle between the FM and LSB mode.
USB/CW	Press to toggle between the USB and CW mode.
REV	Press to exchange the Transmit and receive frequencies. Duplex mode must be selected.
MR	Press to select the Memory channel mode. Use the up and down buttons to change the memory channel number.
F.STEP	Press to cycle thru the available frequency steps. 1, 5, 10 and 50 Hz are available.
SCAN	Press to start and stop the scan mode.
M	Press to store the current frequency into a memory channel. After pressing the key, a series of beeping will sound. Before the beeping stops, press the desired numberic key or the COM key to store the frequency.
OFFSET	Press to select the desired offset direction, (+ or -). This operates in FM mode only.
A/B	Press to toggle between the VFO "A" and VFO "B" mode.
F.LOCK	Press to move down in frequency (in VFO mode) or down in memory channels (in memory mode). Press after the [FUNC] button to lock/unlock the frequency display.
AL	Press to move up in frequency (in VFO mode) or up in memory channels (in memory mode). Press after the [FUNC] key to activate the PRIORITY ALERT mode. In Priority alert mode, memory channel 1 will be checked every 6 seconds for activity.
VOICE / TONE	Press to activate the optional VS-1 voice board. Press after the [FUNC] button to activate the TU-7 optional PL sub-audible tone board.
FUNC	Press to change the key functions of certain keys. Press to toggle the functions on and press again to toggle back to normal key.
COM	Press to select the COMMON frequency. 145.00 is the default frequency. The frequency may be changed. see the [M] key.

Key	FUNCTION
LOW	Press to toggle between LOW and HIGH TX power.
NB	Press to activate the NOISE BLANKER. It will help to elimate automobile and other noise. It will not operate in the FM mode.
RIT	Press to activate the RIT tuning knob. This will allow you to vary the receive frequency without changing the transmit frequency.
	These key make use of the Kenwood DCL (digital channel link) technology. No other manufactures made use of the technology and Kenwood discontinued using it in all their new radios.
<CS	Press to program the digital code and call sign. The optional MU-1 is required.
•C.SQ	Press to toggle the code squelch function on and off. The optional MU-1 is required.
RESET	Press to reset the channel linkage operation. The optional MU-1 is required.
*CHL	Press this ley to cause channel linkage. The optional MU-1 is required.
DCL	Press to toggle the SCL system on and off. The optional MU-1 is required.

AUX (Auxiliary) jack

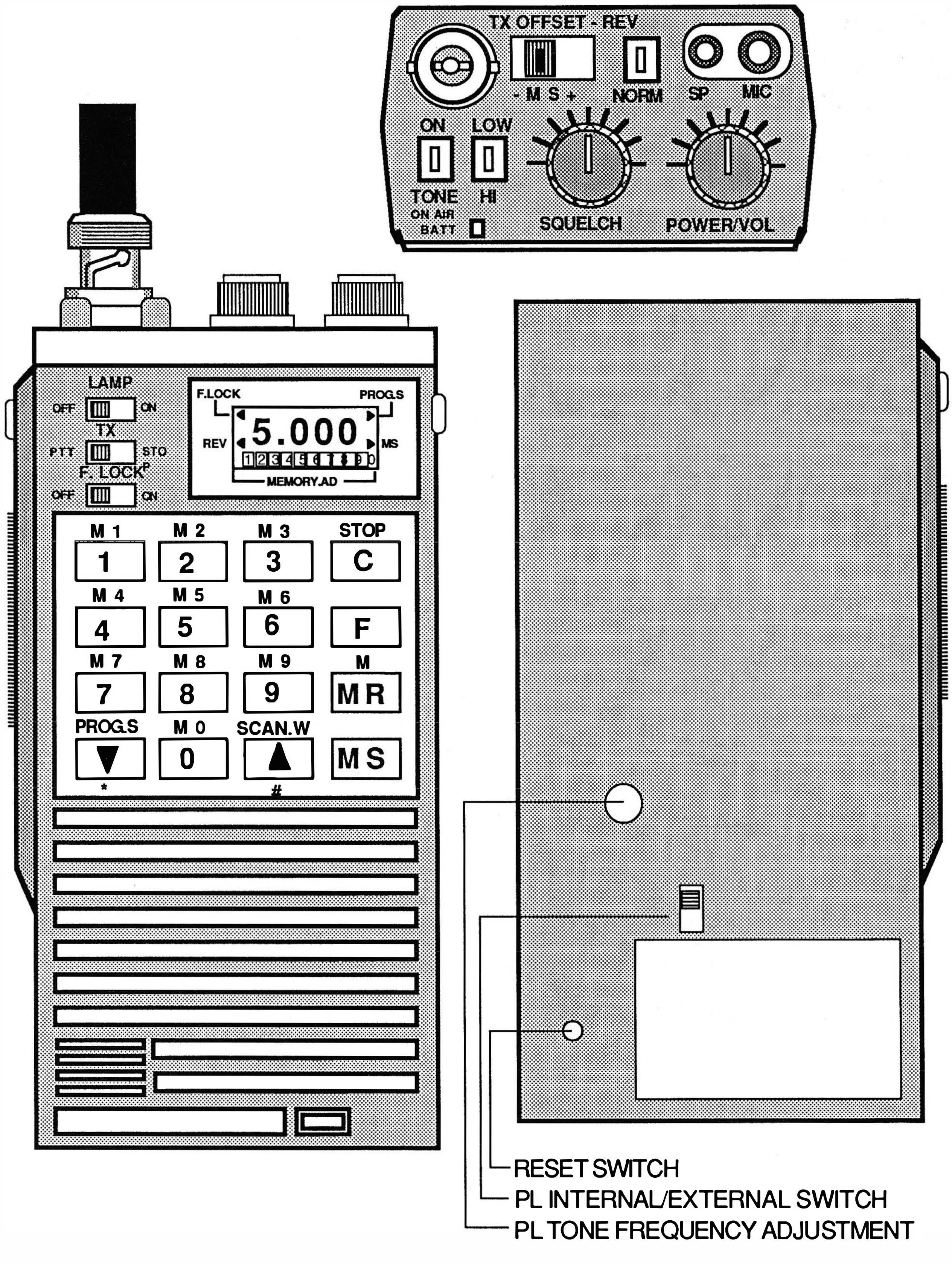


TR-751 & TR-851

Desired Function	Keystrokes
Store a frequency into memory	M [key] Press & hold for 8 beeps + 1 2 3 4 5 6 7 8 Select Memory ch. # — Press again for memory CH. 9 or 0
Storing an ODD-SPLIT Memory Two channels are used for Odd-Split storage. Channels 9 and 0	Enter Receive Frequency & Tone + M [key] Press & hold for 8 beeps + Select & Press Memory ch. 9 or 0 → Enter Transmit Frequency + Select & Press Memory ch. 9 or 0

CHANNEL	ASSIGNMENT
1	PRIORITY ALERT CHANNEL
7	DCL SEARCH START FREQUENCY
8	DCL SEARCH EXCLUDED FREQUENCY
9	ODD SPLIT CHANNEL
0	PROGRAM SCAN FREQUENCY RANGE ODD SPLIT CHANNEL

KENWOOD TR-2500



Key	Commands
M 1 [1] ~ M 0 [0]	Pressed after the [MR] key will recall the frequency stored in the memory. Pressed after the [M] key will stop the current frequency into the memory location.
STOP [C]	Pressed to clear the current frequency and resets to 5.000. Pressed during memory scan or program scan will stop the scan. This key is the DTMF 'A' key
[F]	Press before the [MR] key to select the [M] option. (See buttons [1] ~ [0]. Pressed before the [PROG.S] or [SCAN.W] keys. This key is the DTMF [B] key.
M [MR]	Press to recall a memory. After pressing [MR] select the memory number to recall. ie [1] ~ [0]. Pressed after the [F] key to store the current frequency into a memory. After the key is pressed, select a memory number to stroe the frequency into. ie [1]~[0]. This key is the DTMF [C] key.
[MS]	Press to start the memory scan mode. scanning speed is one memory per second. The scan will stop when a signal is detected and will resume 2 seconds after the signal disappears. Scan may be stopped by pressing the [C] key. This key is the DTMF [D] key.
SCAN.W [▲] #	Press to increase the current frequency up one step. Hold the button down to start automatic scan. The scan will not stop on a busy frequency. Press the [down arrow] key to stop the scan. Pressed after the [F] key to select scan frequency Upper and lower limits along with scan step. (ie 5kHz, 10,15,20,25 or 30kHz) see program scan instructions below. This key is the DTMF [#] key.
PROG.S [▼] *	Press to decrease the current frequency down one step. Hold the button down to start automatic scan. The scan will not stop on a busy frequency. Press the [up arrow] key to stop the scan. Pressed after the [F] key to start the programmable scan mode. This key is the DTMF [*] key.

KENWOOD TR-2500

STORE A FREQUENCY INTO A MEMORY

Enter Frequency + F + MR (M) + Enter Memory # (1 - 0)

RECALL A FREQUENCY FROM A MEMORY

MR (M) + Enter Memory # (1 - 0)

ERASE A MEMORY CHANNEL

F + MR (M) + F + Enter Memory # (1 - 0)

USING THE PROGRAMMABLE SCAN

Enter the lower frequency + F + ▲ (SCAN.W / #) + Enter the next higher frequency. (this set the scan step)

→ F + ▲ (SCAN.W / #) + Enter the highest frequency + F + ▲ (SCAN.W / #)

Note: a beep will sound when entries are complete

To start the scan : F + ▼ (PROG.S)

SPECIFICATIONS

	TR-2500
Freq. Range In MHz	144 -148
Output Power In Watts	2.5 Hi / .3 Low
Sensitivity	1.0uv
Audio Power	400 mW.

Tone/Code Finder

Model TF-1
Model TF-2
Model TCF-3



Pricing	
Tone Only	$189.95
Tone & Digital	$299.95
Tone w/Memory	$239.95
Tone & Digital w/Memory	$339.95

The Tone/Code Finder is composed of a high speed display unit mounted to a scanning receiver. Its purpose is to instantly find and display all **CTCSS** and **DIGITAL** codes, including split channel and inverting codes.

On board memory retains all hit and time information which is then transferred to a printer via a RS 232 port upon command. Time is stored in seconds and hits in units. In the event of power loss, the **FINDER** will maintain memory for up to three weeks.

Signal processing is accomplished by an eight pole filter configured as a low pass with a cutoff of 234Hz. The superior filter characteristics eliminates chopping and false reading.

FEATURES:

- INSTAFIND
- Low Power Consumption
- Base or Mobile Capability
- Hit and Time Accumulator
- Micro Processor Control
- Low Cost
- CMOS LSI Technology
- 3 Year Warranty on Display Unit

SPECIFICATIONS:	TF-1	TF-2* or TCF-3*
Companion Receiver	BC560XLT	BC950/760XLT
Frequency Range	up to 512 MHz	up to 950 MHz
Size	5 1/2" x 6 7/8" x 3 1/2"	6 5/16" x 7 3/8" x 3 1/4"
Weight	2 lb. 12 oz.	3 lb. 4 oz.
Power Source	115VAC or 12VDC	115VAC or 12VDC

**Can be configured as a stand alone unit or coupled to other receivers.*

MEASUREMENTS DIVISION

a i e

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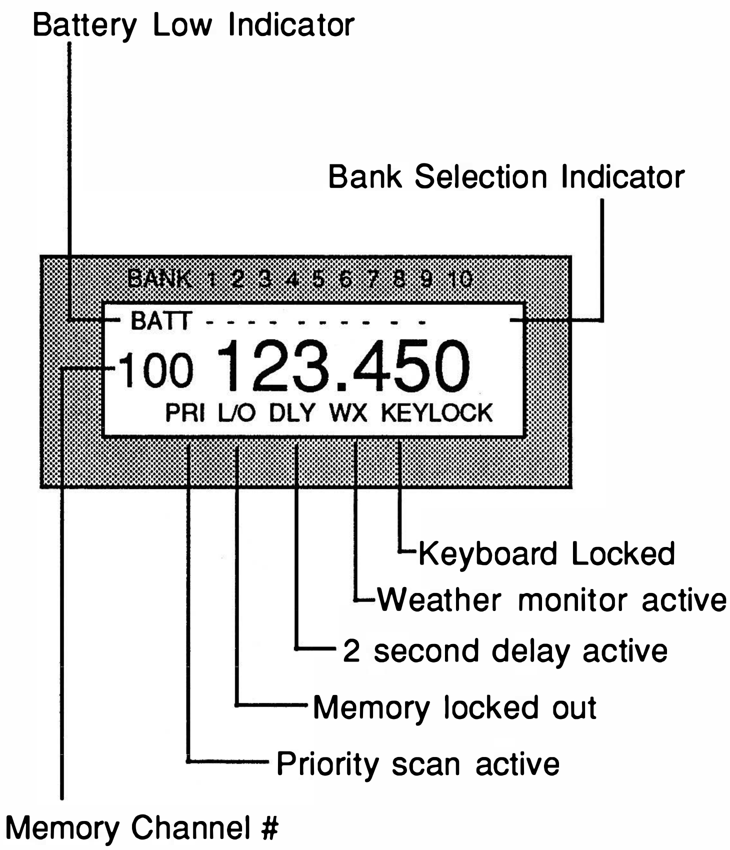
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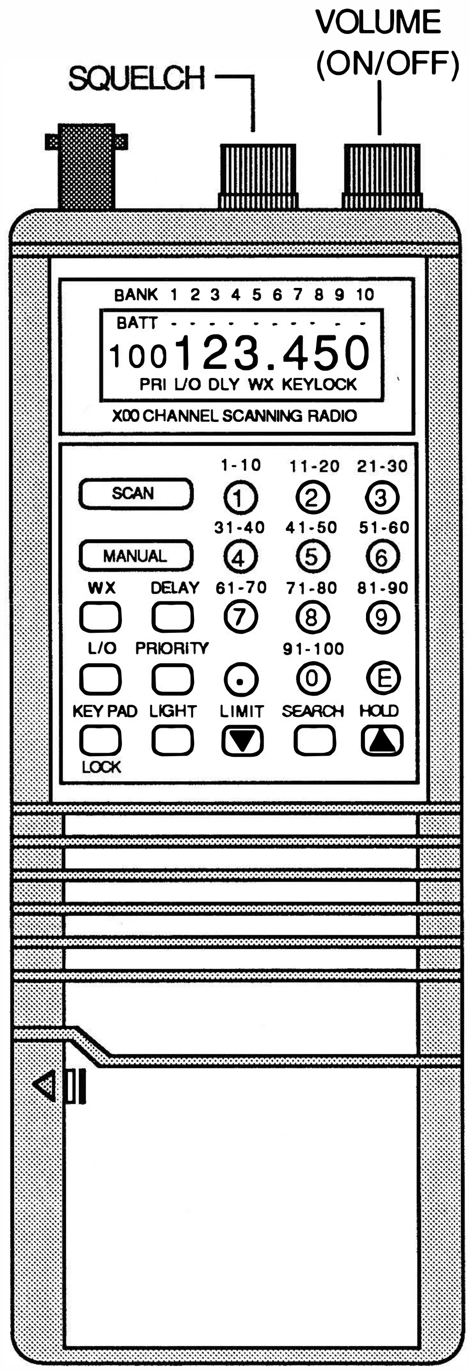
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UNIDEN BEARCAT

BC-100





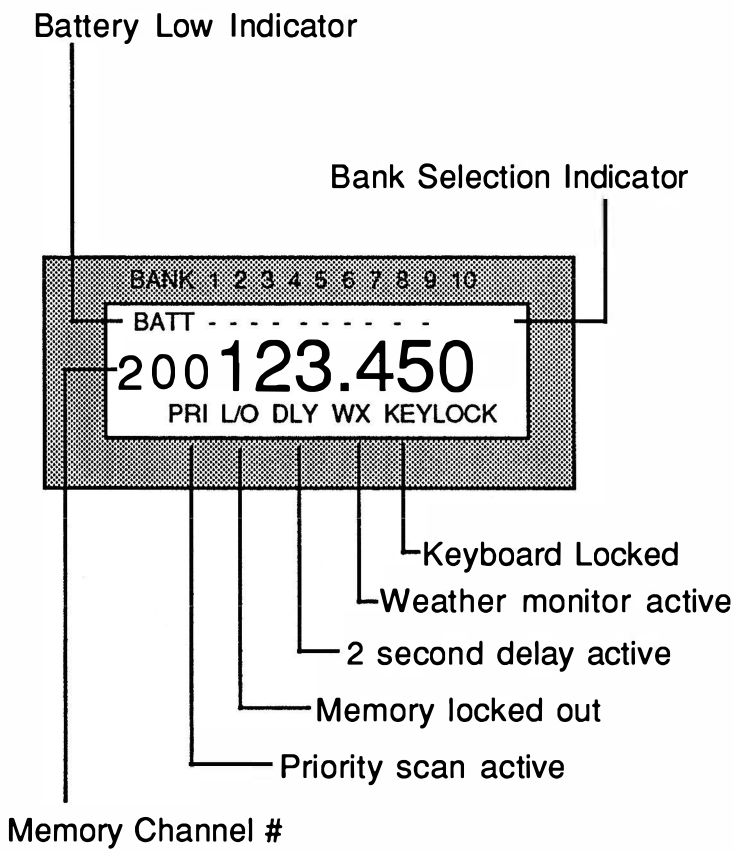
FREQUENCY RANGE
29.0 - 54.0 MHZ
118.0 - 174.0 MHZ
406-512 MHZ

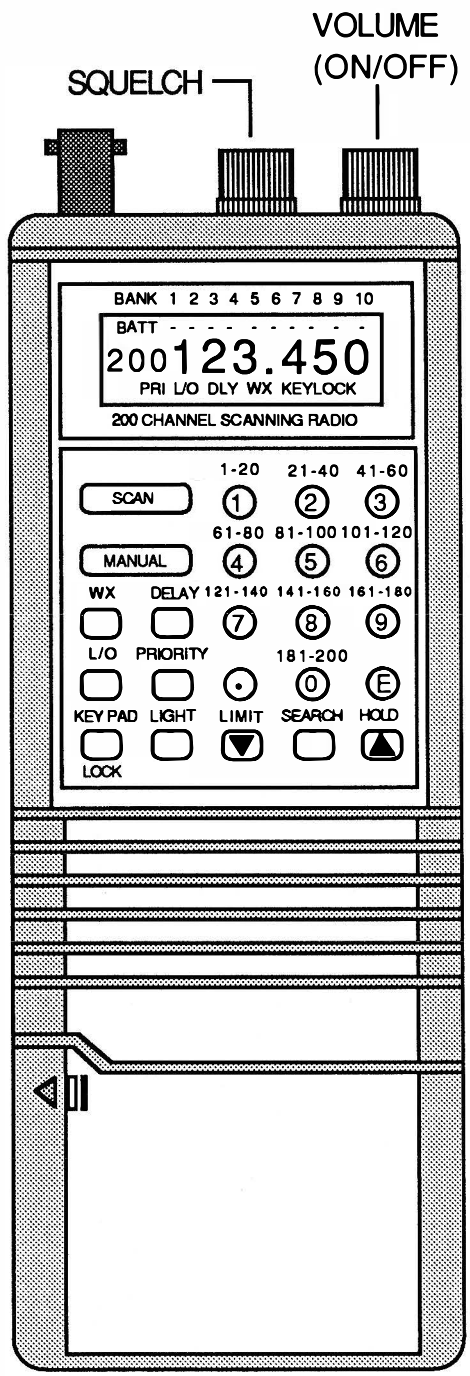
BC-100

SCAN	Press to start scanning all memories that are not locked out within the selected memory banks.
MANUAL	Press to stop scanning. Press to manually step to the next memory channel. Press after entering a channel to jump to that memory channel.
WX	Press to lock on one of the seven national weather frequencies.
L/O	Press to lock out a memory channel. Press again to unlock a memory.
KEY PAD LOCK	Press to lock or unlock the keypad.
DELAY	Press to store a 2 second scan delay into a memory channel.
PRIORITY	Press to activate the priority scan feature. Priority will automatically scan the 1st memory channel in every bank every 2 seconds.
LIGHT	Press to turn on the display light. Light will automatically turn off after 15 seconds.
LIMIT ▼	Press to enter the low and high limits of the search range. Enter lower limit, press [LIMIT], enter upper limit, press [LIMIT]. Press [SEARCH] to scan band within the set limits. Press to manually step down in frequency.
SEARCH	Press to band search an entire frequency range. (see [LIMIT] key.)
HOLD ▲	Press to stop and hold the search function. Press again to manually step up in frequency. Press and hold to rapidly scan up the band.
Ⓔ	Press after entering a frequency to store it in the currently selected memory.
1-10 ① 11-20 ② 21-30 ③ 31-40 ④ 41-50 ⑤ 51-60 ⑥ 61-70 ⑦ 71-80 ⑧ 81-90 ⑨ ⊙ 91-100 ⓪	Number key are used to enter a frequency. When entering a frequency, remember to enter the decimal point in the proper position. Press [E] to store the frequency in the current memory channel. During scanning, pressing a key will select or unselect a memory bank. The bank "-" symbol will turn off when locked out.

UNIDEN BEARCAT

BC-200





FREQUENCY RANGE
29.0 - 54.0 MHZ
118.0 - 174.0 MHZ
406 - 512 MHZ
806 - 956 MHZ

BC-200

Key	Function
SCAN	Press to start scanning all memories that are not locked out within the selected memory banks.
MANUAL	Press to stop scanning. Press to manually step to the next memory channel. Press after entering a channel to jump to that memory channel.
WX	Press to lock on one of the seven national weather frequencies.
L/O	Press to lock out a memory channel. Press again to unlock a memory.
KEY PAD LOCK	Press to lock or unlock the keypad.
DELAY	Press to store a 2 second scan delay into a memory channel.
PRIORITY	Press to activate the priority scan feature. Priority will automatically scan the 1st memory channel in every bank every 2 seconds.
LIGHT	Press to turn on the display light. Light will automatically turn off after 15 seconds.
LIMIT ▼	Press to enter the low and high limits of the search range. Enter lower limit, press [LIMIT], enter upper limit, press [LIMIT]. Press [SEARCH] to scan band within the set limits. Press to manually step down in frequency.
SEARCH	Press to band search an entire frequency range. (see [LIMIT] key.)
HOLD ▲	Press to stop and hold the search function. Press again to manually step up in frequency. Press and hold to rapidly scan up the band.
Ⓔ	Press after entering a frequency to store it in the currently selected memory.
1-10 ① 11-20 ② 21-30 ③ 31-40 ④ 41-50 ⑤ 51-60 ⑥ 61-70 ⑦ 71-80 ⑧ 81-90 ⑨ ⊙ 91-100 ⓪	Number key are used to enter a frequency. When entering a frequency, remember to enter the decimal point in the proper position. Press [E] to store the frequency in the current memory channel. During scanning, pressing a key will select or unselect a memory bank. The bank "-" symbol will turn off when locked out.

BEARCAT

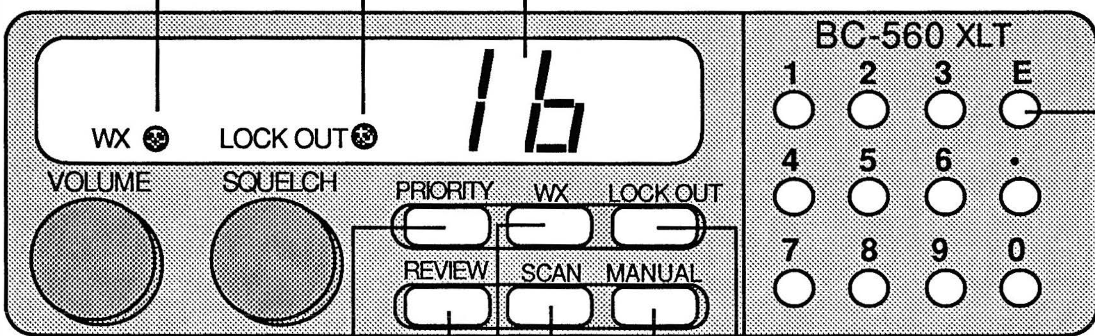
BC-560 XLT

Memory channel locked out

Weather channel monitor active

Memory channel Frequency review display

Press after entering a frequency into a memory channel.



Press to activate or deactivate the priority scan function. Memory #1 will be scanned every 2 seconds.

Press to review the frequency of the current memory channel.

Press to search the NOAA weather channels.
Press [SCAN] or [MANUAL] to exit the weather mode.

Press to lockout or unlock a memory channel from the scan mode.

Press to stop scanning.
Press to step up the next memory channel.
Enter a channel and then press to select that memory.

Press to start scanning all memory channels that are not locked out.

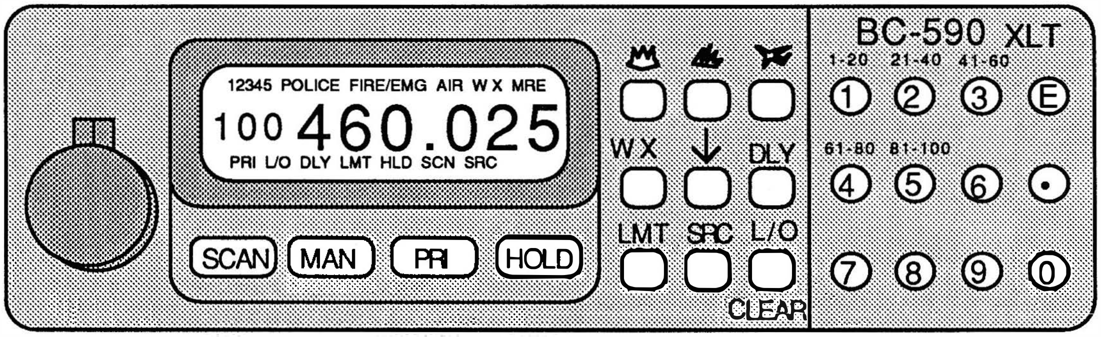
FREQUENCY RANGE
29.0 - 54.0 MHZ
136.0 - 174.0 MHZ
406 - 512 MHZ

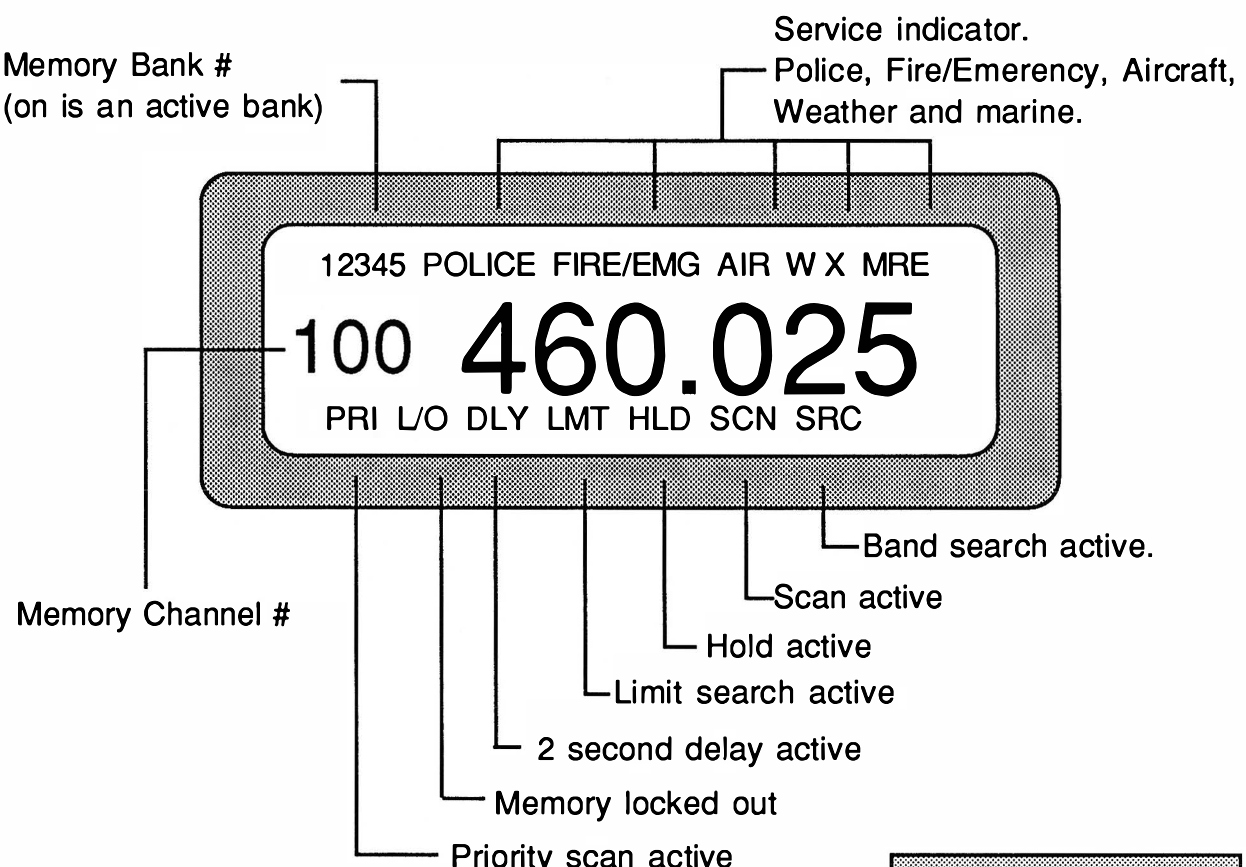
ENTER A FREQUENCY INTO A MEMORY CHANNEL
Enter memory # and press [MANUAL]
Enter Frequency and press [E]

MEMORY CHANNEL ASSIGNMENTS

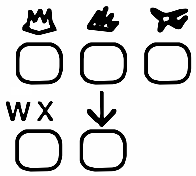
##	FREQ.	DESCRIPTION	##	FREQ.	DESCRIPTION
1			51		
2			52		
3			53		
4			54		
5			55		
6			56		
7			57		
8			58		
9			59		
10			60		
11			61		
12			62		
13			63		
14			64		
15			65		
16			66		
17			67		
18			68		
19			69		
20			70		
21			71		
22			72		
23			73		
24			74		
25			75		
26			76		
27			77		
28			78		
29			79		
30			80		
31			81		
32			82		
33			83		
34			84		
35			85		
36			86		
37			87		
38			88		
39			89		
40			90		
41			91		
42			92		
43			93		
44			94		
45			95		
46			96		
47			97		
48			98		
49			99		
50			100		

BEARCAT
BC-590 XLT

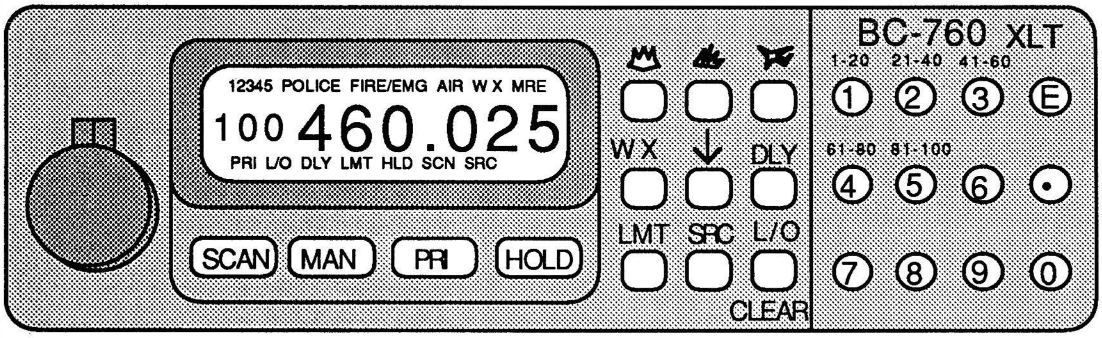




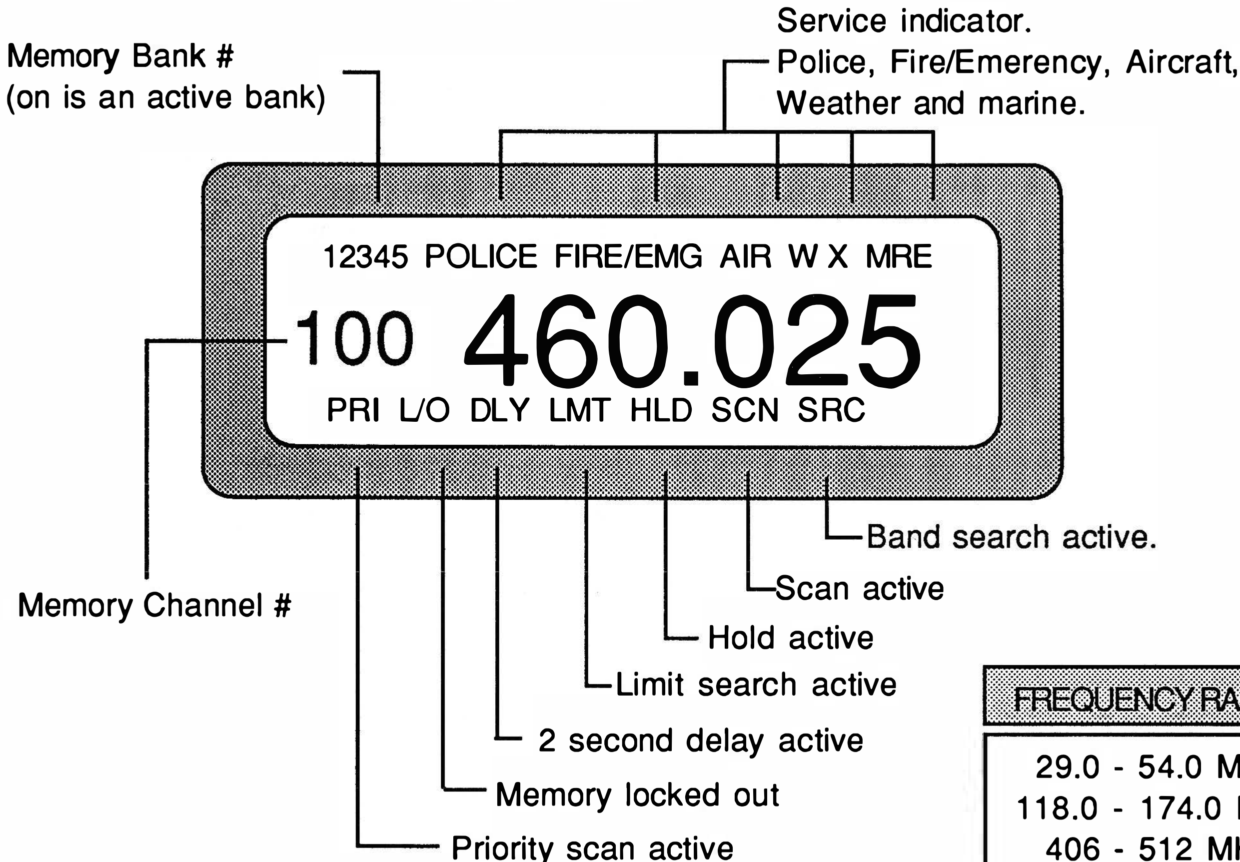
FREQUENCY RANGE
29.0 - 54.0 MHZ
118.0 - 174.0 MHZ
406 - 512 MHZ

	Service Search- Press one of these keys to start searching transmissions of the selected service.
LMT	Use to enter the lower and upper limits of a frequency search. Enter lower frequency, press [LMT], Enter Upper frequency, press [LMT], (see [SRC] key.
SRC	Press to start the freguency search. (see [LMT] ley).
DLY	Press to enter/remove a 2 seconds delay into a memory channel
L/O CLEAR	Press to enter/remove a scan lockout into a memory channel. Hold for 3 seconds to clear all locked memories.
SCAN	Press to start scanning all memories not locked out.
MAN	Press to stop scanning. Enter channel # and then press [MAN] to jump to the channel.
PRI	Press to active priority scan. Memory 1 will be scanned every 2 seconds.
HOLD	Press to stop the scan function. Press again to step up in frequency.
1-20 21-40 41-60 ① ② ③ Ⓔ 61-80 81-100 ④ ⑤ ⑥ ⊙ ⑦ ⑧ ⑨ ⓪	Number key are used to enter a frequency. When entering a frequency, remember to enter the decimal point in the proper position. Press [E] to store the frequency in the current memory channel. During scanning, pressing a key will select or unselect a memory bank. The bank # will turn off when locked out.

BEARCAT
BC-760 XLT



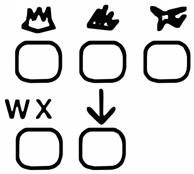
A KEYBOARD LOCK-OUT switch is located on the back of the radio.



FREQUENCY RANGE
29.0 - 54.0 MHZ
118.0 - 174.0 MHZ
406 - 512 MHZ
806 - 912 MHZ

Optional CTCSS Board Operation

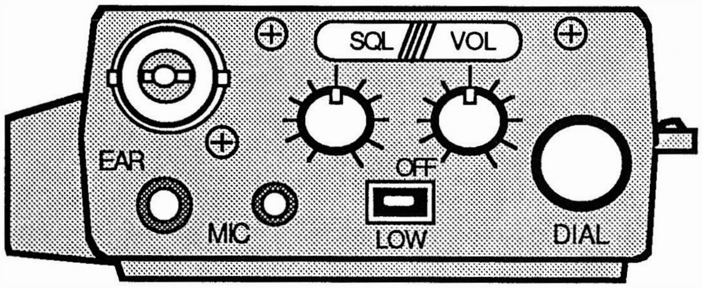
When using the CTCSS board, and the CTCSS switch is on, the Squelch control will not operate.
Enter the frequency to monitor and press [E], enter the CTCSS tone and press [E]. The display will alternately flash the frequency and CTCSS tone.

	Service Search- Press one of these keys to start searching transmissions of the selected service.
LMT	Use to enter the lower and upper limits of a frequency search. Enter lower frequency, press [LMT], Enter Upper frequency, press [LMT], (see [SRC] key.
SRC	Press to start the freguency search. (see [LMT] ley).
DLY	Press to enter/remove a 2 seconds delay into a memory channel
L/O CLEAR	Press to enter/remove a scan lockout into a memory channel. Hold for 3 seconds to clear all locked memories.
SCAN	Press to start scanning all memories not locked out.
MAN	Press to stop scanning. Enter channel # and then press [MAN] to jump to the channel.
PRI	Press to active priority scan. Memory 1 will be scanned every 2 seconds.
HOLD	Press to stop the scan function. Press again to step up in frequency.
1-20 21-40 41-60 1 2 3 E 61-80 81-100 4 5 6 . 7 8 9 0	Number key are used to enter a frequency. When entering a frequency, remember to enter the decimal point in the proper position. Press [E] to store the frequency in the current memory channel. During scanning, pressing a key will select or unselect a memory bank. The bank # will turn off when locked out.

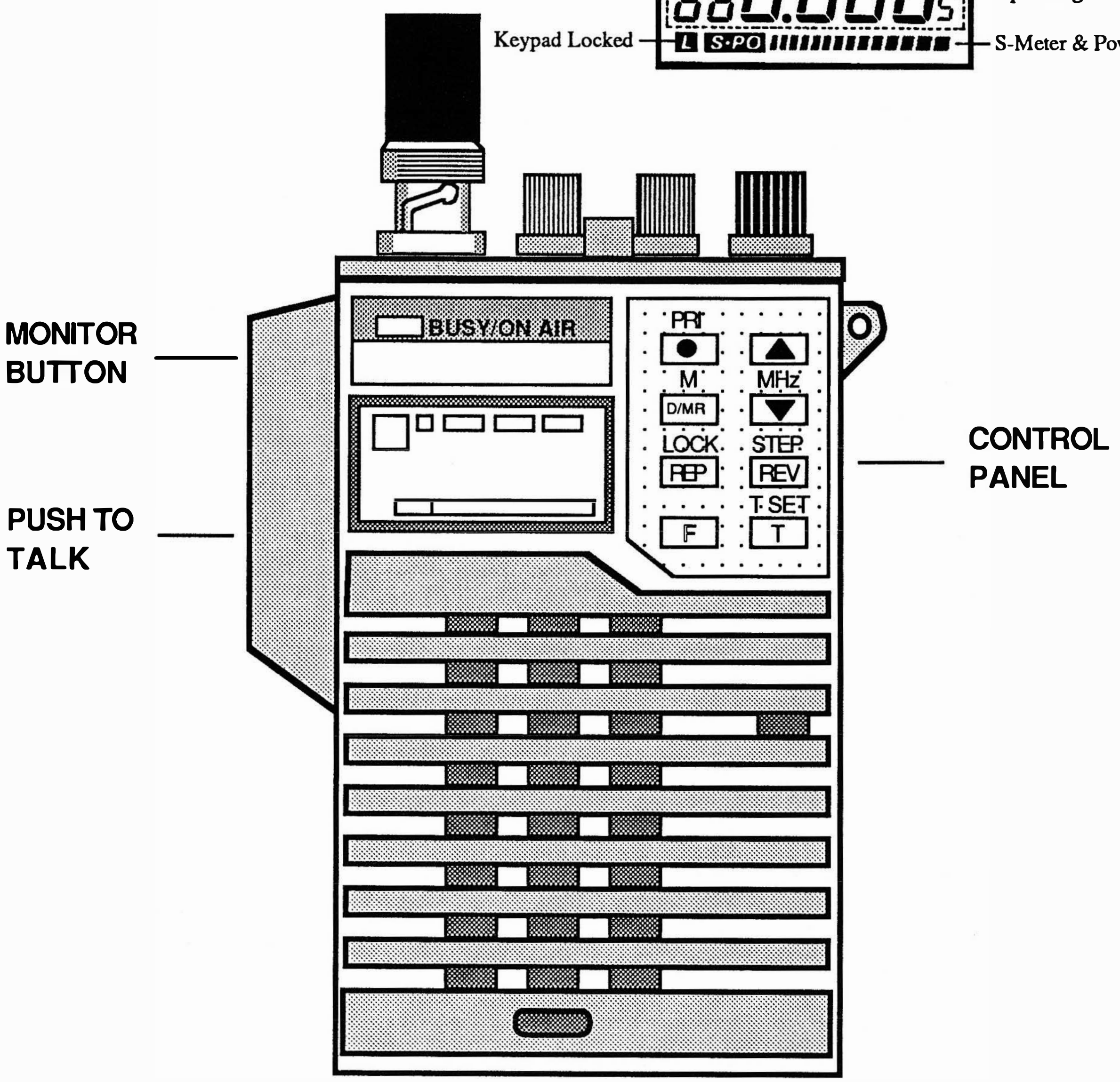
MEMORY #	FREQUENCY	OFFSET	PL TONE	OTHER
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
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YAESU FT-X3R

FT-23R, FT-33R AND FT-73R



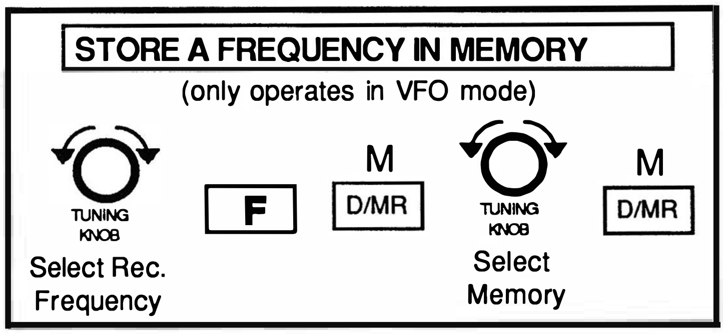


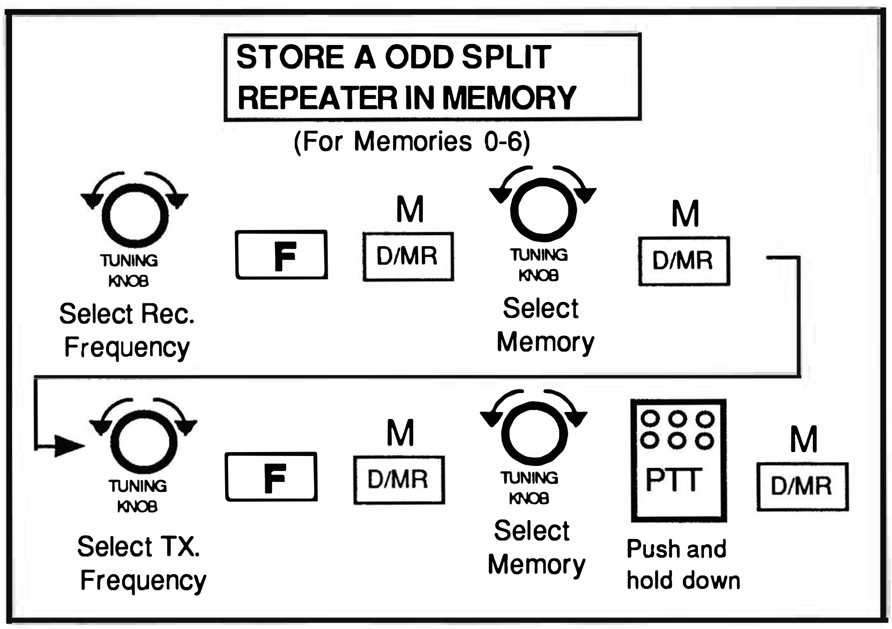


YAESU FT-X3R

Key	Commands
PRI ●	Press to activate the priority channel scan(Memory channel 1). Select the memory channel you wish to monitor and the press the [PRI] key. To cancel press the [D/MR] key. Pressed after the [F] key activate the priority channel scan(Memory channel 0). Press any other to cancel.
M D/MR	Press to switch between the VFO and Memory modes. In the Memory mode, the channel number will appear in the upper left of the display. Pressed after the [F] key to store the VFO frequency information into a memory channel. After pressing the [M] key you must select a memory channel using the Dial selector and the press the [M] key again to complete the store a memory operation.
LOCK REP	Press to select the desired repeater offset direction. Options are simplex, + (up) and - (down). The + or - simbol will appear on the display to indicate the direction. No + or - indicated simplex operation, both the + and - indicate an odd-split. Only Memories 0-6 can store an odd split. Pressed after the [F] key to lock and unlock the keyboard. In the Lock mode, a "L" will appear in the bottom left of the display. In the LOck mode the Dial Knob is not locked!
F	This is the Function key. This key must be pressed and released to select any of the keyboard commands imprinted above the other keys. When the [F] key is pressed, a "F" symbol will appear in the display. You must press another key within 4 seconds.
▲ MHz	Press to increment the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. (In VFO mode only). Pressed after the [F] key to increment the operating frequency by one megahertz.
MHz ▼	Press to decrement the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. (In VFO mode only). Pressed after the [F] key to decrement the operating frequency by one megahertz.
STEP REV	Press to reverse the Transmit/Receive Frequencies while in the [SHIFT]/Repeater mode. The display will flash the + or - symbol while in this mode. Operates in VFO and Memory modes. Pressed after the [F] key to change the frequency step. The step is the amount of frequency change that occurs when you turn the dial selector.
T SET T	Pressed in Memory and VFO mode, this key will cause the transmitted signal to be encoded with a PL subaudable tone. (The optional FTS-12 is required) Press the [T] key again to activate the decode (CTCSS)mode. When in the decode mode, the incoming signal must have the proper PL tone to be received. Pressed after the [F] key to change the subaudable (PL) tone. Use the Dial selector to change to the desired PL tone. Press the [T SET] again to exit the mode. Changes to a memory channel will not be retained after the VFO or another memory channel is selected.

YAESU FT-X3R

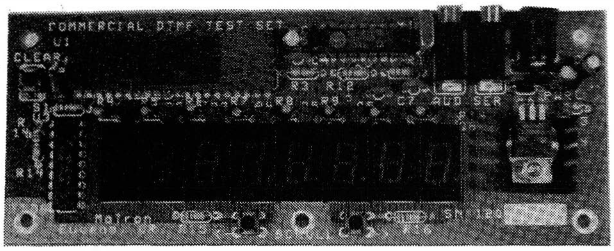




SPECIFICATIONS

	FT-23R	FT-33R	FT-73R
Freq. Range In MHz	144 -148	220 - 224	440 - 450
Output Power In Watts	5 Hi / .5 Low	5 Hi / .5 Low	4 Hi / .4 Low
Sensitivity	.25uv	.25uv	.25uv
Channel Steps	.05 or .10	.25 or .50	.125 or .25

HEAR THE TONES. . .SEE THE NUMBERS!



*EIGHT DIGIT DISPLAY
*32 CHARACTER MEMORY
*ASCII SERIAL OUTPUT

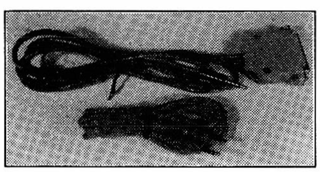
MoTron TDD-8 TOUCH-TONE DECODER DISPLAY AND ASCII CONVERSION BOARD

The MoTron **TDD-8** is a wired and tested commercial touchtone test decoder board. The **TDD-8** decodes and displays all 16 touch-tone signals. The eight digit display, 32 character memory and left-right scroll function allows the user to capture and display up to 40 characters without loss of information. An ASCII serial output can be connected to a computer for automatic logging or remote data entry. The MoTron "Tonelog" IBM compatible software package is included with each TDD-8 at no additional charge. The computer interface cable can be purchased separately if needed.

Connect to almost any audio source - The MoTron **TDD-8** can be connected to a scanner, communications receiver, tape recorder, telephone answering machine etc.

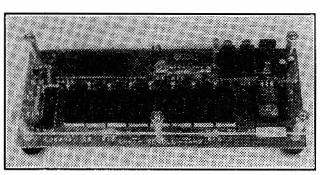
IBM compatable software included - The **TDD-8** is a stand-alone device and does not need to be connected to a computer for decoding and displaying touch-tone digits. However, a serial ASCII output is provided on the board that can be connected to the RS-232 serial port of almost any computer. This allows you to use the **TDD-8** for numerous applications. The "Tonelog" IBM compatible sofware, that is included, will automatically log the date and time a number is decoded.

TDD-8 Touch-tone decoder with eight digit display, 32 character memory and ASCII serial output (wired/tested circuit board). **$99.00**



CAB-1 - Includes audio and computer cables. Audio patch-cord can be connected to most scanner and receiver speaker or earphone jacks. Mini phono plugs (3.5mm) on each end. Computer cable has mini phono (3.5mm) plug for connection to the TDD-8 and female DB-25 on the other end for computer connection. **$20.00**

PS-12 - 110VAC adapter. **$10.00**



PMK-1 - Plastic Mounting Kit. This is not a complete enclosure, but offers a simple means of protecting the board, making it easier to handle and use. Kit includes hard plastic sheets to cover the bottom and top of the board. Also included are rubber feet, spacers, nuts and bolts **$15.00**

ADD $5.00 FOR SHIPPING AND HANDLING. VISA/MC ACCEPTED.

Satisfaction guaranteed or your money back within 30 days of purchase (less shipping/handling). 90 day warranty on parts and labor.

Specifications: Board size: 6"X 2-3/8", Power requirements: 9 to 12 VDC @200 ma, DTMF response time: 40 ms (can decode fast auto-dialers), Audio input: 100 mv to 6 Vpp, Serial output: 1200 baud, 8 data bits, no parity.

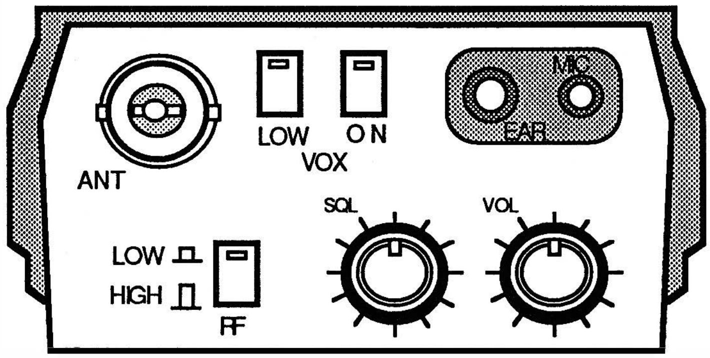
MoTron Electronics
310 Garfield St., Suite 4
Eugene, OR 97402

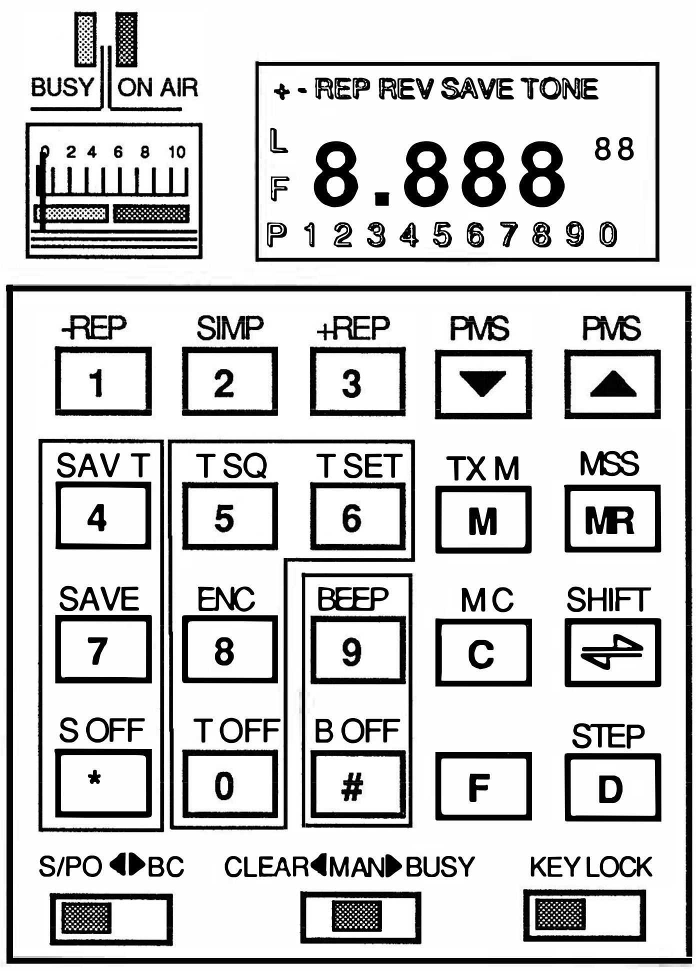
ORDERS: 1-800-338-9058
INFO: (503) 687-2118
FAX: (503) 687-2492

(Touch-tone is a trademark of AT&T)

YAESU FT-x09R

FT-209R, FT-109R AND FT-709R





Key	Functions FT-209R, FT-109R AND FT-709R
-REP [1]	Pressed after the [F] key to select the down repeater offset. This option is selected when using a repeater with a down shift.(See [SHIFT] key)
SIMP [2]	Pressed after the [F] key to select no repeater offset. Thisoption is selected when Simplex operation is needed.
+REP [3]	Pressed after the [F] key to select the down repeater offset. This option is selected when using a repeater with a down shift. (See [SHIFT] key)
PMS [▼]	Press to decrement the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to select Programmed Memory Scan. This key will start scanning at the frequency held in the last selected memory channel. Scanning will continue until the frequency reaches the frequency held in the previous memory channel.
PMS [▲]	Press to increment the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to select Programmed Memory Scan. This key will start scanning at the frequency held in the last selected memory channel. Scanning will continue until the frequency reaches the frequency held in the next memory channel.
SAV T [4]	Pressed after the [F] key will set the current power saver timer. Intervals are selected by entering a number 0-9 and then the [SAV T]. 1=300ms, 2=600 (default), 3=900, 4=1200, 5=1500, 6=1800, 7=2100, 8=2400 9=2700, 0=3000 (3 seconds)
T SQ [5]	Pressed after the [F] key will set the tone squelch mode (FTS-6 PL board required). An incomming signal must have the proper PL tone or the radio will not unsquelch.
T SET [6]	Pressed after the [F] key will set the subaudable PL tone. The tone is selected by entering the proper PL tone number 0-42 and then the [T SET] key. See PL table below.
TX M [M]	Press to store the VFO Frequency into a memory channel. Enter Frequency and then the [D] key. Enter the Memory channel number (0-9) and press the [M] key. Pressed after the [F] key to enter a separate Transmit frequency. This function is used to operate "Odd Split" repeaters. Enter Receive frequency described above and then enter the Transmit frequency and press [D]. Enter the Memory channel # and then the [TX M] key.
MSS [MR]	Press to enter memory mode. In the VFO mode you may enter a memory channel # and then press the [MR] key to enter memory mode and recall that exact memory. Pressed after the [F] key will set mask a memory channel during the memory scan mode. Enter the memory channel number (0-9) and the [MSS] key. To reinstate the memory channel enter the cannel number and then the [MR] key and then the [MR] key. To check what memories are unmasked press [MR] and [MR] again.

Key	Functions FT-209R, FT-109R AND FT-709R
SAVE [7]	Pressed after the [F] key to activate the power save mode. See the [SAV T] key. The save mode will remain active even after the radio is turned off and back on. See the [S OFF] key.
ENC [8]	Pressed after the [F] key to activate the PL subaudible encoder. See the [T set] key. A PL tone is required by some repeaters. The optional FTS-6 is required.
BEEP [9]	Pressed after the [F] key to activate the beep tone. When active a beep tone will sound when you press a keyboard key or when scanning stops.
MC [C]	Press to clear the current keyboard entry. Pressed after the [F] key to unmask a memory channel. See the [MSS] key. Enter the memory channel (0-9) and then the [MC] key.
SHIFT [⇄]	Press to reverse the transmit and receive frequencies. The REV symbol will appear on the display. The +REP or -Rep mode must be in effect to use the reverse feature. Pressed after the [F] key to change the offset for +REP and -REP mode. Enter the receive frequency and press the [D] key. Enter the new offset, not the transmit frequency but the offset value (0.6 for 2 meters, 1.6 for 220 and 5.0 for 440) and press the [SHIFT] key.
S OFF [*]	Press to jump to the calling channel (Memory channel 1) Pressed after the [F] key to deactivate the battery save mode. See the [SAVE] key.
T OFF [0]	Pressed after the [F] key to deactivate the PL encode/Decode operation. See the [ENC] key.
B OFF [#]	Press to activate the Priority scan mode. Allows you to operate in the dial mode while the system automatically checks the last selected memory channel for activity. Pressed after the [F] key to deactivate the beep tone. See the [BEEP] key.
[F]	Press before selecting any of the keyboard commands located above the key itself.
STEP [D]	Pressed after the [F] key to change the frequency step for the PMS scan mode. Enter a scan step number (0-9) and then press the [STEP] key. The review the step, press the [D] key and then the [STEP] key. NOTE: There is a button located in the battery mounting track that controls the normal scanning step.
S/PO ◀▶ BC	This switch controls the function of the meter. In the S/PO position the meter will show the signal strenght of the received signal and the relitive power output during transmission. In the BC position the meter will show the battery condition.
CLEAR◀MAN▶BUSY	This switch controls the scan stop mode. In the CLEAR position the scanning will stop when a clear frequency is found. In the MANUAL mode the scanning will stop when you release the up or down arrow key. In the BUSY position the scanning will stop when a busy frequency is found.
KEY LOCK	This switch controls the keyboard. In the LOCK position no keyboard entrys are allowed. In the unlock position, all keyboard commands are accepted.

SPECIFICATIONS

	FT-209	FT-109	FT-709
Freq. Range in MHz	144 -148	220 - 224	440 - 450
Output Power in Watts	5 Hi / .5 Low	5 Hi / .5 Low	4 Hi / .4 Low
Sensitivity	.25uv	.25uv	.25uv
Channel Steps	.25 or .50	.25 or .50	.25 or .50

STORE A FREQUENCY IN MEMORY

STEP **D** + Enter Frequency + STEP **D** + Select optional offset and tone + Enter Memory Channel # (0-9) + TX M **M**

STORE AN ODD-SPLIT REPEATER

STEP **D** + Enter Frequency + STEP **D** + Select optional offset and tone + Enter Memory Channel # (0-9) + TX M **M**

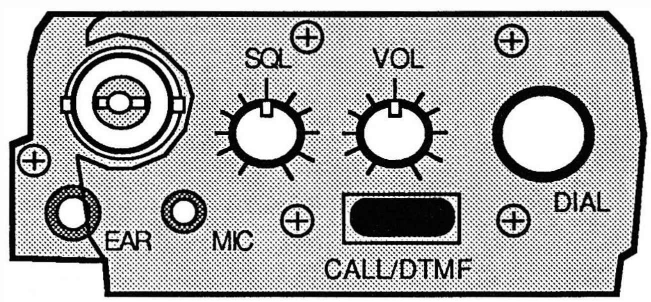
→ Enter Transmit Frequency + STEP **D** + Enter Memory Channel # (0-9) + **F** + TX M **M**

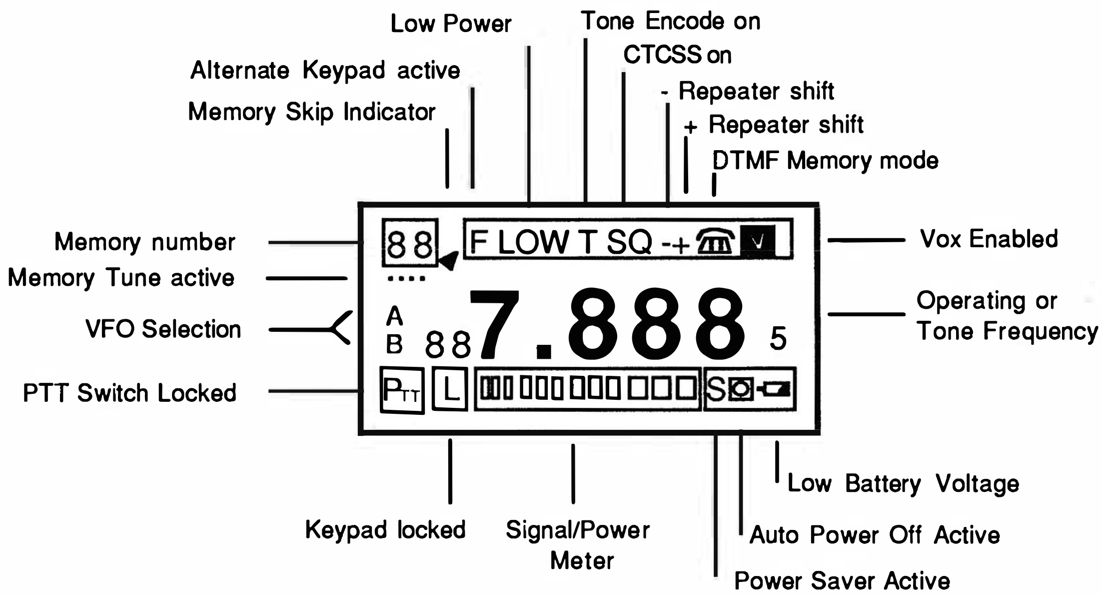
PL TONE CHART

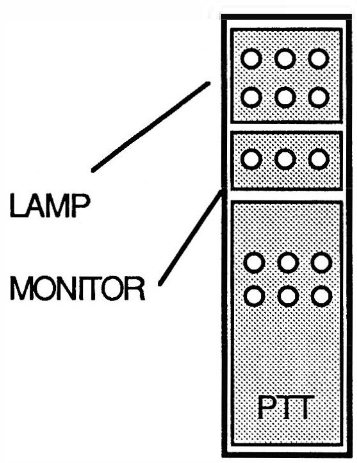
TONE No.	Frequency in Hz	TONE No.	Frequency in Hz	TONE No.	Frequency in Hz
1	67.0	15	131.8	30	225.7
2	71.9	16	136.5	31	233.6
3	77.0	17	141.3	32	241.8
4	82.5	18	146.2	33	250.3
5	88.5	19	151.4	34	67.0
6	94.8	20	156.7	35	71.9
7	100.0	21	162.3	36	74.4
8	103.5	22	167.9	37	77.0
9	107.2	23	173.8	38	79.7
10	110.9	24	179.9	39	82.5
11	114.8	25	186.2	40	85.4
12	118.8	26	192.8	41	88.5
13	123.0	27	203.5	42	91.5
14	127.3	28	210.7	63	1000
		29	218.1		

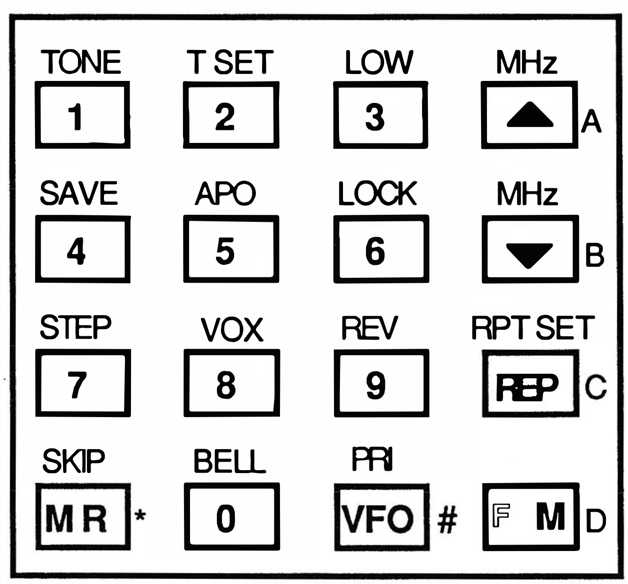
YAESU FT- 11

YAESU FT-411, FT-811, FT-911









YAESU FT-411, FT-811, FT-911

Key	Functions
TONE [1]	With Function key - Toggle between PL Encode, Decode and PL off.
T SET [2]	With Function key - Select a PL tone using the Tuning knob. Press again when done.
LOW [3]	With Function key - Select Low/High power
SAVE [4]	With Function key - Select Power Saver function. After selecting the function, an option control of the power saver intervals can be selected by pressing a number key from 1-9. To turn off Power save press [FUNCTION] [SAVE] [0]. A "S" will appear when the function is operating.
APO [5]	With Function key - Turn on/off automatic power off feature. The Power off timing is controlled by holding the 1, 2, or 3 key while turning the power on. 1=10 minutes, 2=20 minutes and 3=30 minutes.
LOCK [6]	With Function key - Toggle the keyboard and PTT lock. A user may need to activate the full power of this key; hold down the [6] key while turning on the radio.
STEP [7]	With Function key - Select the tuning step. Select step with the tuning knob and then press the [STEP] again.
VOX [8]	With Function key - Toggle the VOX function between LO, High sensitivity and off.
REV [9]	With Function key - Reverse the Transmit and Receive Frequencies during the Duplex mode.
BELL [0]	With Function key - Turn the CTCSS Paging function on/off. The bell will sound when the proper PL tone is received.
SKIP [MR] *	Alone - Enter Memory mode. With Function key and in Memory mode.- Toggle on/off the SCAN lock out feature.
PRI [VFO] #	Alone - Enter VFO mode. With Function key and in Memory mode.- Turns on Memory 1 as priority. Memory 1 will be scanned every 5 seconds. Press PTT to deactivate.

YAESU FT-411, FT-811, FT-911

Key	Functions
MHz [▲] A	Alone - Tune up in Frequency or Memory. With Function key and in VFO mode.- Change Frequency up 1 megahertz.
MHz [▼] B	Alone - Tune up in Frequency or Memory. With Function key and in VFO mode.- Change Frequency down 1 megahertz.
RPT SET [REP] C	Alone - Select +, - or Simplex offset. With Function key -Selects Repeater offset. Use Freq. knob to change offset. Press again to change offset.
[F M] D	Alone - This is the Function key used by all keyboard commands. Hold key down until 2 beeps sound to select Memory storage mode. Then dial desired memory channel and press key again.
CALL/DTMF	Alone - toggles between the Call channel and the Memory or VFO With Function key - toggles the DTMF memory mode on and off.

SPECIFICATIONS

	FT-411	FT-811	FT-911
Freq. Range in MHz	144-148	430 - 450	
Current drain TX/RX	9.5 / .4	6.5/ .4	8.5/ .4
Output Power in Watts	.15 / 1.	.15 / 1.6	5 / 35
Sensitivity	< .16 uv.	< .158 uv.	< . uv.
Channel Steps		5,10,12.5 20 & 25 KHz	

YAESU FT-411, FT-811, FT-911

STORE A FREQUENCY IN MEMORY

(only operates in VFO mode)

1. TUNING KNOB — Select Frequency
2. F M — Hold for 2 beep sounds
3. TUNING KNOB — Select Memory
4. F M

STORE A ODD SPLIT REPEATER IN MEMORY

1. TUNING KNOB — Select Rec. Frequency
2. F M — Hold for 2 beep sounds
3. TUNING KNOB — Select Memory
4. F M
5. TUNING KNOB — Select TX. Frequency
6. F M — Hold for 2 beep sounds
7. PTT — Push and hold down
8. F M

TRANSFER A MEMORY INTO THE VFO

SKIP MR, F M, PRI VFO

CHANGE THE TUNING STEP

1. F M
2. STEP 7
3. TUNING KNOB — Select Step
4. STEP 7

MEMORY SKIP (SCAN)

F M, SKIP MR

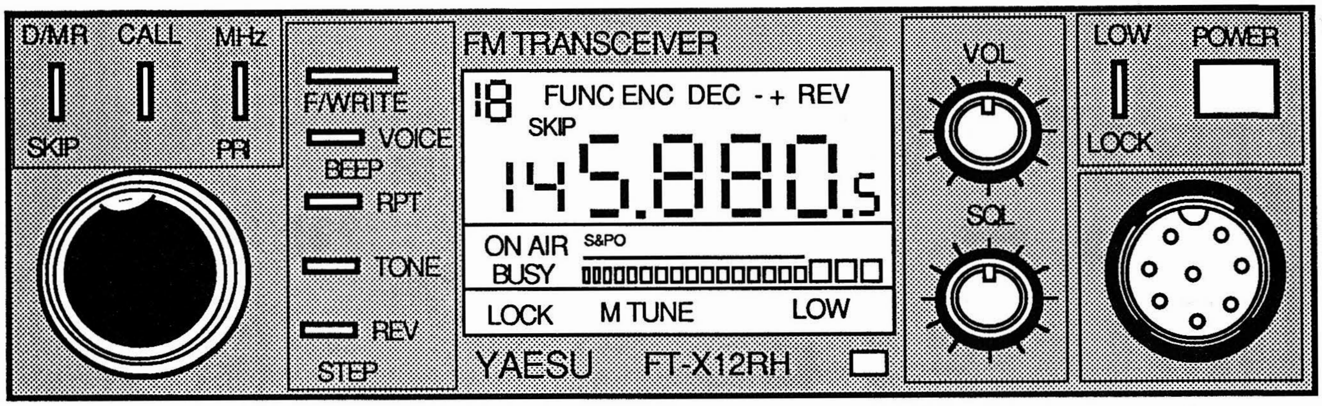
DTMF MEMORY STORAGE

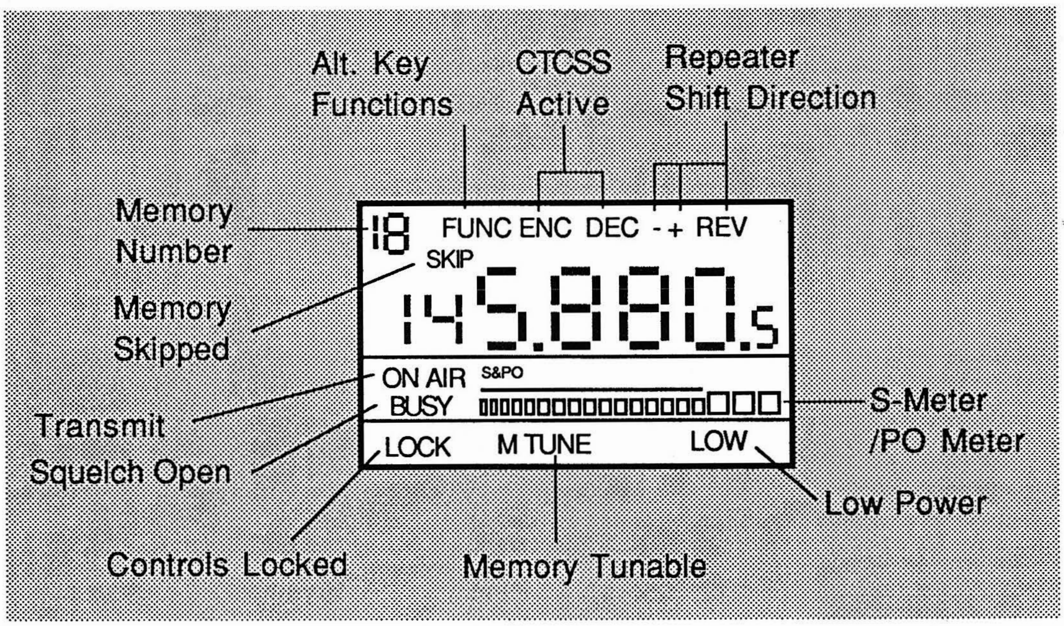
1. F M, CALL/DTMF — Activate DTMF mode
2. F M — Hold down for 1.2 seconds until second beep
3. TONE 1 — Select a memory number 0-9
4. F M — Hold down for 1.2 seconds until second beep
5. TONE 1 ~ STEP 7 — Enter DTMF Keys Up to 15 keys.
6. CALL/DTMF — Press briefly
7. TONE 1 — Press memory number again to hear DTMF codes.
8. CALL/DTMF — Press to return to the normal display.

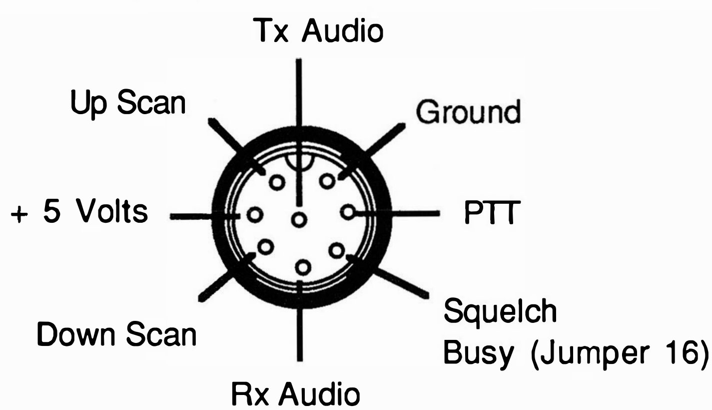
To Activate DTMF memory :Activate DTMF mode, Press PTT and then press the number of the of the memory to send.

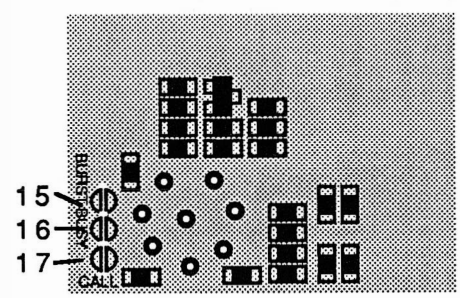
YAESU FT-X12RH

FT-212RH & FT-712RH









Rear View of Microphone circuit board

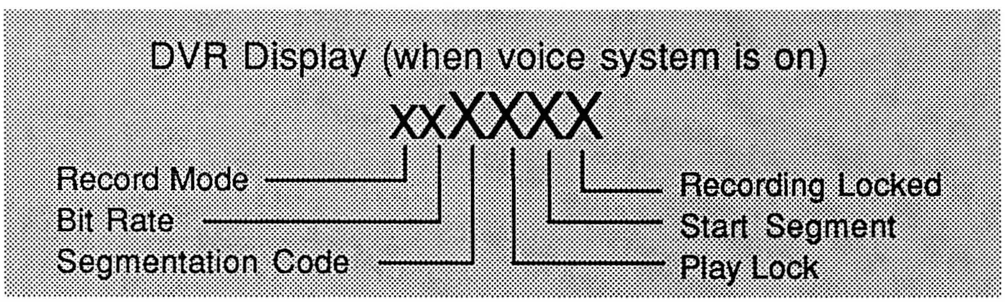
Amps Low/High	Power High/Low	Audio Output	Sensitivity
4 / 10	45/5	1.5 W	>25uV

Desired Function	Dial/Memory	Keystrokes
Beeper On/Off	D/M	F/WRITE + VOICE BEEP
CALL Channel Recall	D/M	CALL
Channel Step Selection	D	F/WRITE + REV STEP + Dial + REV STEP
Hide a Memory	M	F/WRITE + REV STEP
Unhide a Memory	M	F/WRITE + Dial + REV STEP
Lock/Unlock Keyboard	D/M	F/WRITE + LOW LOCK
Memory Recall	D	D/MR SKIP + Dial
Memory Tune	M	MHz PRI + Dial
Memory Storage	D	Dial + F/WRITE + Dial SELECT MEMORY CH. + F/WRITE
Memory Storage of Transmit Freq.	D	Dial + F/WRITE + Dial SELECT MEMORY CH. + PTT Push & Hold + F/WRITE
Change Standard Offset	D/M	F/WRITE + RPT + Dial SELECT OFFSET + RPT
Skip/Unskip a Memory	M	Dial SELECT MEMORY CH. + F/WRITE + D/MR SKIP
Set PL/CTCSS Tone	D/M	F/WRITE + TONE + Dial SELECT TONE + TONE
Priority Mon (VFO)	D	D/MR SKIP + Dial + D/MR SKIP + F/WRITE + MHz PRI
Priority Mon (Memory)	M	F/WRITE + MHz PRI

F/WRITE Press and hold for at least 1/2 second until [FUNC] appears on display

Digital Voice Recorder Commands (DVR-1 Required)

Desired Function	Keystrokes
Voice System on/off	VOICE / BEEP
Bit Rate Selection	REV / STEP + Dial + REV / STEP
Input Selection (Mic/Speaker)	TONE S will appear for Speaker, M for Microphone
Record Input	UP Located on Microphone Button
Playback (Speaker)	DOWN Located on Microphone Button
Playback on the air	PTT Push & Hold + DOWN
Remote DTMF Control	RPT
Lock out Recording and Playback	MHz / PRI
Lock out Recording only	MHz / PRI + MHz / PRI



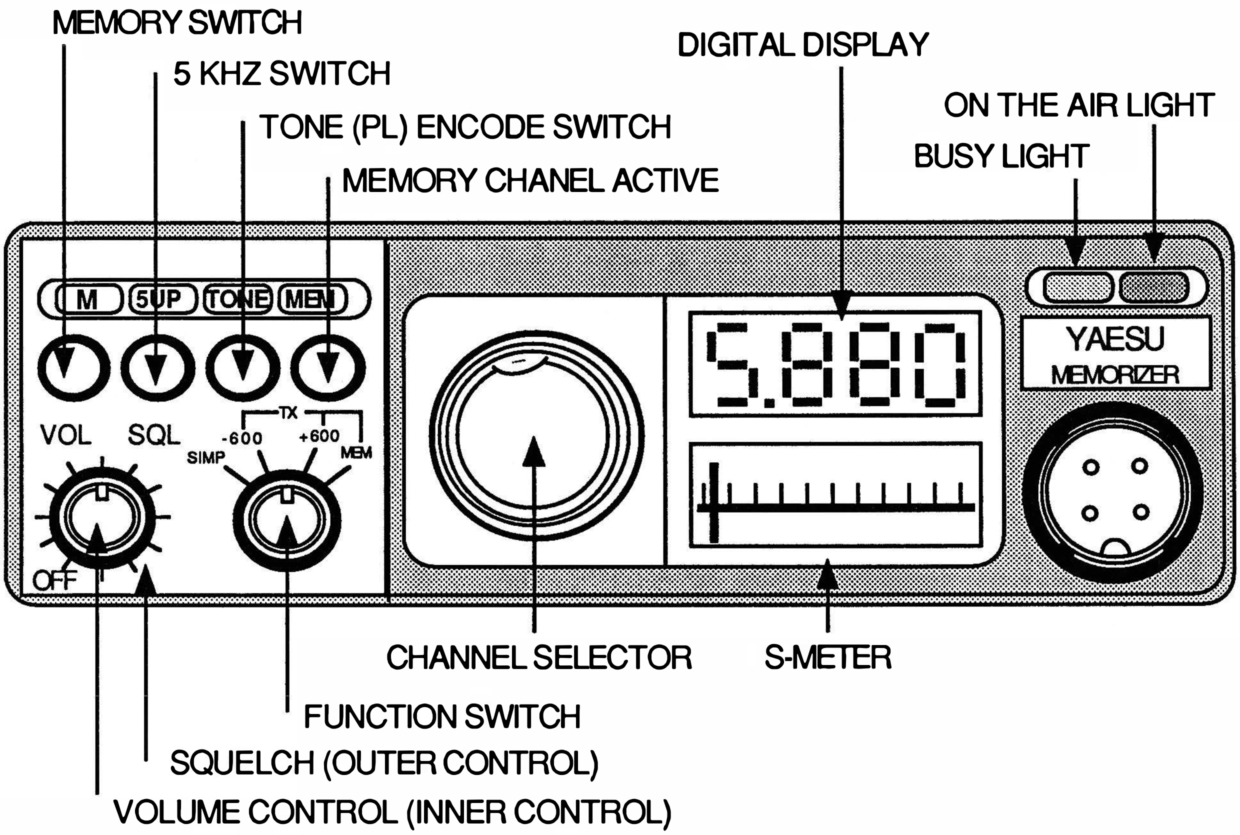
Control by another Radio with a DTMF Microphone

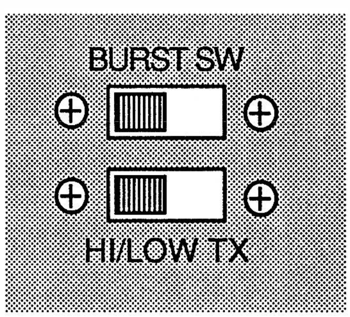
Function	DTMF Code	Description	Response
Reset	###	Cancel input or stop recording	
Check Empty	#00	Check for unused segment(s)	High/Low tone=Success
Record All	*00	Record segments 2 through 8	Callsign played=Success
Record One	*01	Record in any 9unlocked0 segment	Callsign played=Success
Bit Rate	*1(r)	Set Bit Rate r=(1-4) for recording	Callsign played=Success
Confirm	#01	Playback last recording to confirm	Callsign & Beep=Success
Lock Last	*02	Lock last recording	High/Low tone=Success
Play All	#10	Playback all unlocked segments	Callsign & Beep=Success
Play one	#1(x)	Playback segment x=(1-8)	Callsign & Beep=Success
Unlock All	#20	Unlock all locked segments	High/Low tone=Success
Unlock One	#2(x)	Unlock segment x=(1-8)	High/Low tone=Success

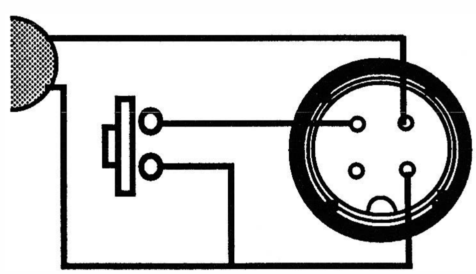
Notes

YAESU FT-227R

MEMORIZER



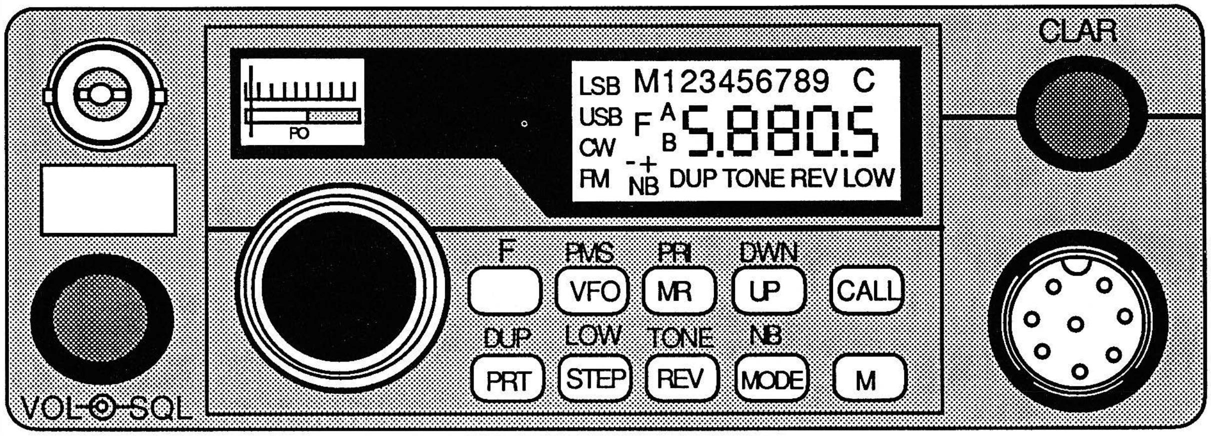


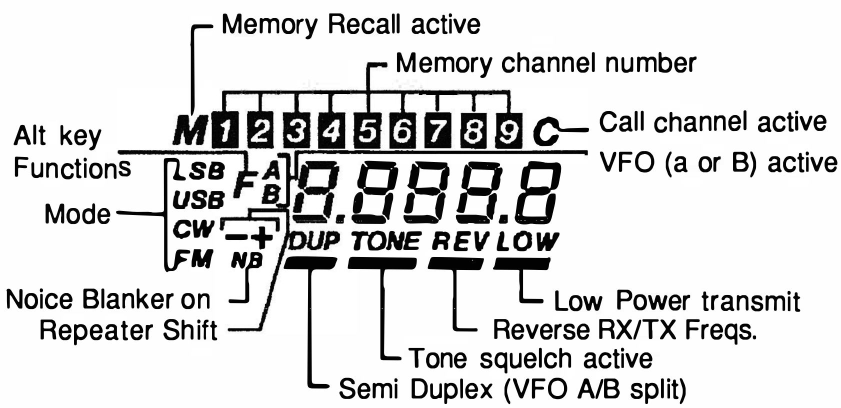


Amps Low/High	Power High/Low	Audio Output	Sensitivity
2.5/1	10/1	1.5 W	>.3uV

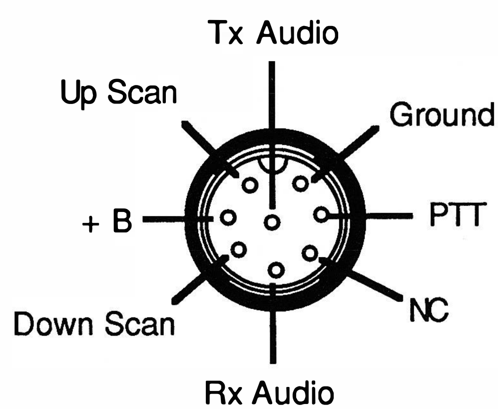
Notes

YAESU FT-290RII





Amps Low/High	Power High/Low	Audio Output	Sensitivity
.1/1.1	.5/2.5	1.0 W	>.25uV



Yaesu FT-290

Key	FUNCTION
F	FUNCTION KEY- Press to activate alternate keys. Press another key within 3 seconds.
PMS / VFO	VFO-Press to enter the VFO mode, press to switch between VFO A & B PMS-Press to activate Program memory scan (Memories 1 & 2)
PRI / MR	MR- Press to enter the Memory channel mode PRI- Press to activate the Priority Memory channel scan while in the VFO.
DWN / UP	UP- Press to move up in Frequency (1 MHz in FM 100KHz in SSB/CW) DWN- Press to move down in Frequency (1 MHz in FM 100KHz in SSB/CW)
CALL	CALL- Press to jump to the CALL channel. Press after the [M] key to store a freqency into the CALL memory
DUP / PRT	RPT- Press the select the Transmitter Offset direction. DUP- Press to activate the DUPLEX operation with the VFO A and VFO B.
LOW / STEP	STEP- Press to select the Frequency steps (25, 100 and 2500Hz for CW/SSB) LOW- Press to select Low/High Transmitter power
TONE / REV	REV- Press to exchange the transmit and receive frequencies. TONE- Press to activate the optional FTS-7 PL encoder/decoder.
NB / MODE	MODE- Press to select the operating mode. (FM, CW, USB or LSB) NB- Press to activate/deactivate the noise Blanker
M	M- Press to store a VFO Frequency into a Memory.

FTS-7 DIP SWITCH PROGRAMMING

	SWITCH NUMBER ✱					
FREQ	1	2	3	4	5	6
67.0Hz	O	—	—	—	—	—
71.9	—	O	—	—	—	—
74.4	—	—	O	—	—	O
77.0	O	O	—	—	—	—
79.7	—	O	O	—	—	O
82.5	—	—	O	—	—	—
85.4	—	—	—	O	—	O
88.5	O	—	O	—	—	—
91.5	—	O	—	O	—	O
94.8	—	O	O	—	—	—
100.0	O	O	O	—	—	—
103.5	—	—	—	O	—	—
107.2	O	—	—	O	—	—
110.9	—	O	—	O	—	—
114.8	O	O	—	O	—	—
118.8	—	—	O	O	—	—
123.0	O	—	O	O	—	—
127.3	—	O	O	O	—	—
131.8	O	O	O	O	—	—

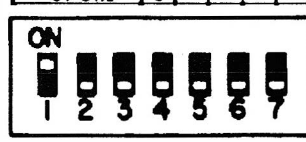
	SWITCH NUMBER ✱					
FREQ	1	2	3	4	5	6
136.5Hz	—	—	—	—	O	—
141.3	O	—	—	—	O	—
146.2	—	O	—	—	O	—
151.4	O	O	—	—	O	—
156.7	—	—	O	—	O	—
162.2	O	—	O	—	O	—
167.9	—	O	O	—	O	—
173.8	O	O	O	—	O	—
179.9	—	—	—	O	O	—
186.2	O	—	—	O	O	—
192.8	—	O	—	O	O	—
203.5	O	O	—	O	O	—
210.7	—	—	O	O	O	—
218.1	O	—	O	O	O	—
225.7	—	O	O	O	O	—
233.6	O	O	O	O	O	—
241.8	—	—	—	—	—	O
250.3	O	—	—	—	—	O

✱ DIP SW O = ON

DIP SW NO⑦ ON = TONE SQUELCH
OFF = ENCODER ONLY

EXAMPLES

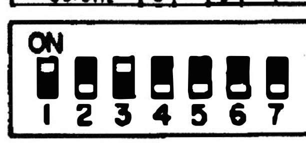
	SWITCH NUMBER ✱					
FREQ	1	2	3	4	5	6
67.0Hz	O	—	—	—	—	—



67.0Hz

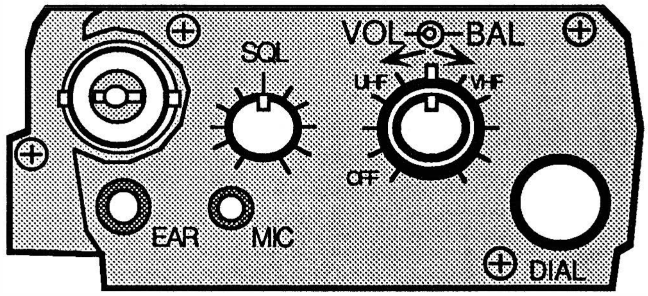
ON = Enc/Dec
OFF = Encoder only

	SWITCH NUMBER ✱					
FREQ	1	2	3	4	5	6
88.5Hz	O	—	O	—	—	—

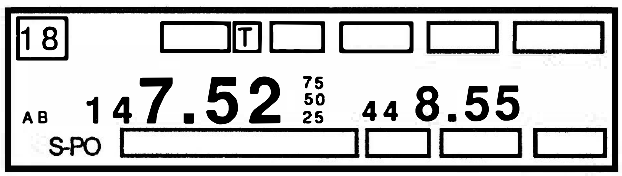


88.5Hz

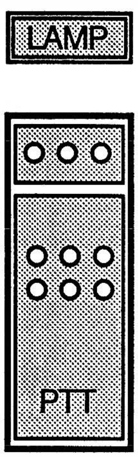
YAESU FT-470



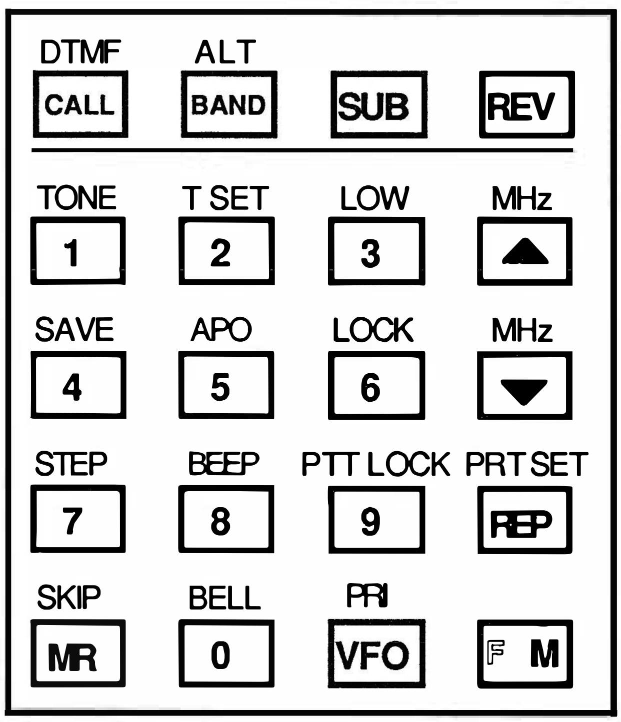
SQL
VOL-◎-BAL
UHF
VHF
OFF
EAR
MIC
DIAL



18
T
AB 147.52 75 50 25 448.55
S-PO



LAMP
PTT



DTMF CALL
ALT BAND
SUB
REV
TONE 1
T SET 2
LOW 3
MHz ▲
SAVE 4
APO 5
LOCK 6
MHz ▼
STEP 7
BEEP 8
PTT LOCK 9
PRT SET REP
SKIP MR
BELL 0
PRI VFO
F M

Key	Commands YAESU FT-470
TONE [1]	After pressing the Function key - Turn PL / CTCSS tone on/off.
T SET [2]	After pressing the Function key - Select a PL tone using the Tuning knob. Press again when done.
LOW [3]	After pressing the Function key - Select Low/High power
SAVE [4]	After pressing the Function key - Select Power Saver function. After selecting the function, an option control of the power saver intervals can be selected by pressing a number key from 1-9. To turn off Power save press [FUNCTION] [SAVE] [0]. A "S" will appear when the function is operating.
APO [5]	After pressing the Function key - Turn on/off automatic power off feature. The Power off timing is controlled by holding the 1, 2, or 3 key while turning the power on. 1=10 minutes, 2=20 minutes and 3=30 minutes.
LOCK [6]	After pressing the Function key - Turn the keyboard lock on/off.
STEP [7]	After pressing the Function key - Select the tuning step. Select step with the tuning knob and then press the [STEP] again.
BEEP [8]	After pressing the Function key - Turn the keyboard beep sound on/off.
PTT LOCK [9]	After pressing the Function key - Turn the PTT lock on/off.
BELL [0]	With Function key - Turn the CTCSS Paging function on/off. The bell will sound when the proper PL tone is received.
DTMF [CALL]	Alone - toggles vbetween the Call channel and the Memory or VFO With Function key - toggles the DTMF memory mode on and off.
ALT [BAND]	Alone - Exchange the Main display with the sub display band. After pressing the Function key the Alert mode is activated.

YAESU FT-470

Key	Commands
SUB	Alone - Toggles on and off the Sub band display.
REV	Alone - Exchange the Transmit and Receive frequencies while in the Duplex repeater mode.
SKIP MR	Alone - Enter Memory mode. After pressing the Function key and in Memory mode.- Toggle on/off the SCAN lock out feature.
PRI VFO	Alone - Enter VFO mode. After pressing the Function key and in Memory mode.- Turns on Memory 1 as priority. Memory 1 will be scanned every 5 seconds. Press PTT to deactivate.
MHz ▲	Alone - Tune up in Frequency or Memory. After pressing the Function key and in VFO mode.- Change Frequency up 1 megahertz.
MHz ▼	Alone - Tune up in Frequency or Memory. After pressing the Function key and in VFO mode.- Change Frequency down 1 megahertz.
PRT SET REP	Alone - Select +, - or Simplex offset. After pressing the Function key -Selects Repeater offset. Use Freq. knob to change offset. Press again to change offset.
F M	Alone - This is the Function key used by all keyboard commands. Hold key down until 2 beeps sound to select Memory storage mode. Then dial desired memory channel and press key again.

SPECIFICATIONS

	FT-470
Freq. Range in MHz	140-170 430-450
Current drain TX/RX	9.5 / .4
Output Power in Watts	. / .
Sensitivity	< .16 uv.
Channel Steps	

YAESU FT-470

STORE A FREQUENCY IN MEMORY

(only operates in VFO mode)

TUNING KNOB — Select Frequency

F M — Hold for 2 beep sounds

TUNING KNOB — Select Memory

F M

STORE A ODD SPLIT REPEATER IN MEMORY

TUNING KNOB — Select Rec. Frequency

F M — Hold for 2 beep sounds

TUNING KNOB — Select Memory

F M

TUNING KNOB — Select TX. Frequency

F M — Hold for 2 beep sounds

PTT — Push and hold down

F M

TRANSFER A MEMORY INTO THE VFO

SKIP MR

F M

PRI VFO

CHANGE THE TUNING STEP

F M

STEP 7

TUNING KNOB — Select Step

STEP 7

MEMORY SKIP (SCAN)

F M

SKIP MR

DTMF MEMORY STORAGE

F M, DTMF CALL — Activate DTMF mode

F M — Hold down for 1.2 seconds until second beep

TONE 1 — Select a memory number 0-9

F M — Hold down for 1.2 seconds until second beep

TONE 1 ~ STEP 7 — Enter DTMF Keys Up to 15 keys.

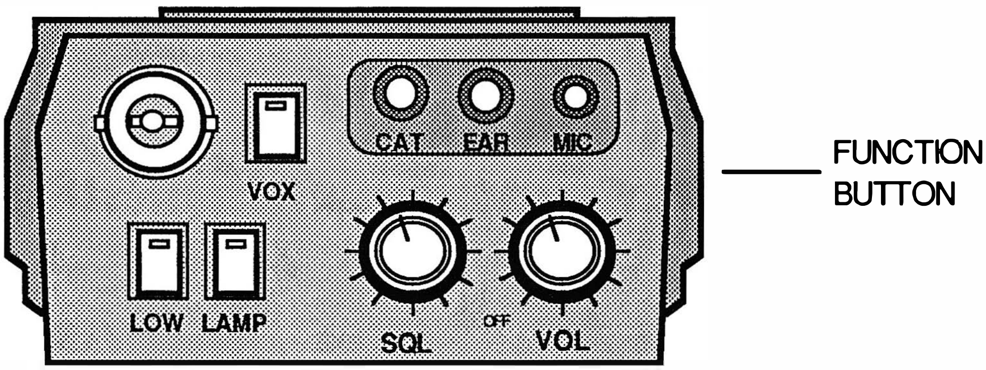
DTMF CALL — Press briefly

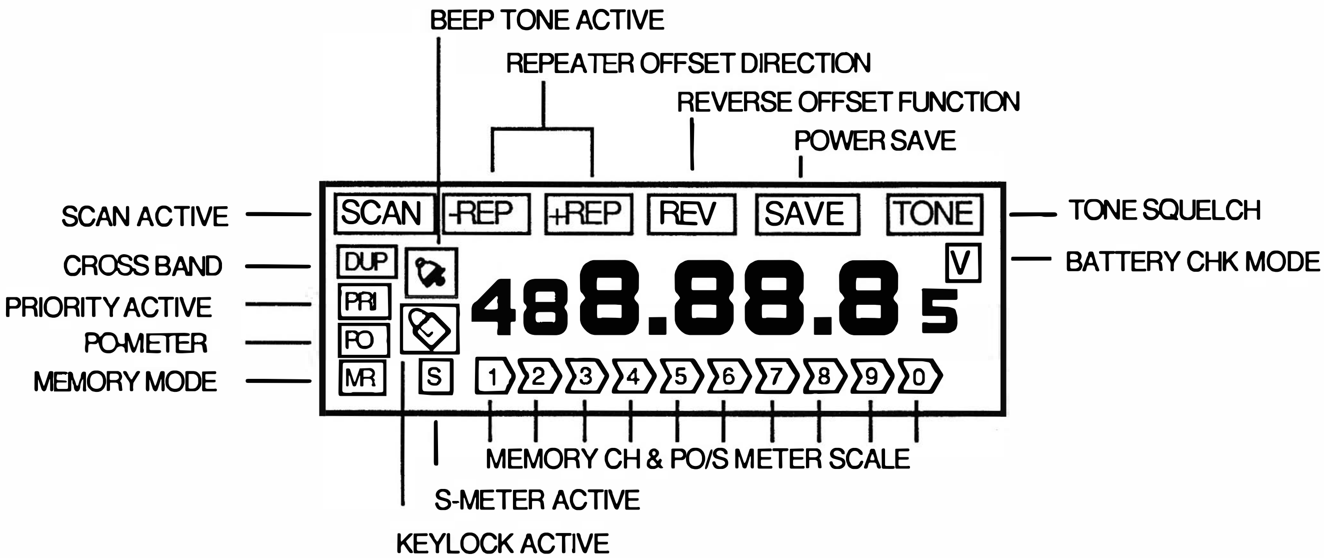
TONE 1 — Press memory number again to hear DTMF codes.

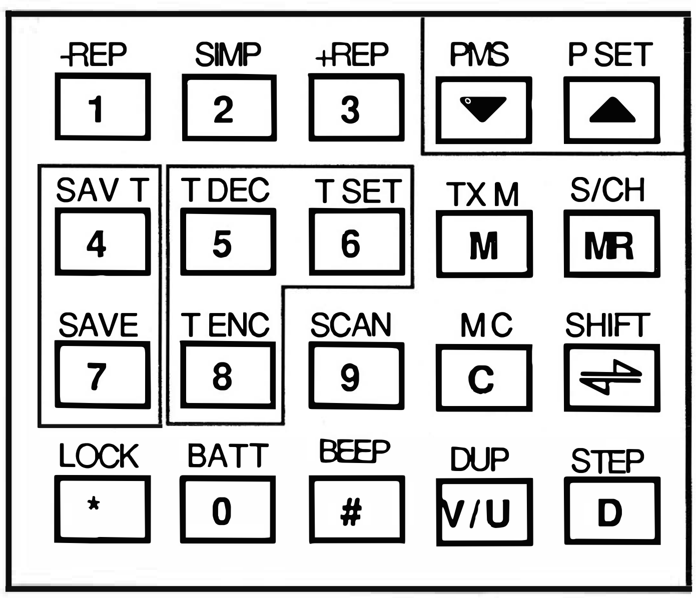
DTMF CALL — Press to return to the normal display.

To Activate DTMF memory :Activate DTMF mode, Press PTT and then press the number of the of the memory to send.

YAESU FT-727R







Key	Commands
-REP [1]	Pressed after the [F] key to select the down repeater offset. This option is selected when using a repeater with a down shift.(See [SHIFT] key)
SIMP [2]	Pressed after the [F] key to select no repeater offset. Thisoption is selected when Simplex operation is needed.
+REP [3]	Pressed after the [F] key to select the down repeater offset. Thisoption is selected when using a repeater with a down shift. (See [SHIFT] key)
PMS [▼]	Press to decrement the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to select Programmed Memory Scan. This key will start scanning at the frequency held in the last selected memory channel. Scanning will continue until the frequency reaches the frequency held in the previous memory channel.
P SET [▲]	Press to increment the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to select the number of steps to scan. Enter in a new number and the press [P set] again.
SAV T [4]	Pressed after the [F] key will set the current power saver timer. Intervals are selected by entering a number 0-9 and then the [SAV T].
T DEC [5]	Pressed after the [F] key will set the tone squelch mode (FTS-6 PL board required). An incomming signal must have the proper PL tone or the radio will not unsquelch.
T SET [6]	Pressed after the [F] key will set the subaudable PL tone. Selecte the proper PL tone using the up and down aroow keys and then press the [T SET] key. See PL table below.
TX M [M]	Press to store the VFO Frequency into a memory channel. Enter Frequency and then the [D] key. Enter the Memory channel number (0-9) and press the [M] key. Pressed after the [F] key to enter a separate Transmit frequency. This function is used to operate "Odd Split" repeaters. Enter Receive frequency described above and then enter the Transmit frequency and press [D]. Enter the Memory channel # and then the [TX M] key. Only available for memories 1- 4.
S/CH [MR]	Press to enter memory mode. In the VFO mode you may enter a memory channel # and then press the [MR] key to enter memory mode and recall that exact memory. Pressed after the [F] key will toggle the S-meter or memory channel indicators.

Key	Commands
SAVE [7]	Pressed after the [F] key to activate/ deactivate the power save mode. See the [SAV T] key. The save mode will remain active even after the radio is turned off and back on.
T ENC [8]	Pressed after the [F] key to activate the PL subaudible encoder. See the [T set] key. A PL tone is required by some repeaters. The optional FTS-6 is required.
SCAN [9]	Pressed after the [F] key to activate the scan mode. Hold down the up or down arrow keys to start the scanning.
MC [C]	Press to clear the current keyboard entry. Pressed after the [F] key to unmask a memory channel. See the [MSS] key. Enter the memory channel (0-9) and then the [MC] key.
SHIFT [⇌]	Press to reverse the transmit and receive frequencies. The REV symbol will appear on the display. The +REP or -Rep mode must be in effect to use the reverse feature. Pressed after the [F] key to change the offset for +REP and -REP mode. Enter the receive frequency and press the [D] key. Enter the new offset, not the transmit frequency but the offset value (0.6 for 2 meters, 1.6 for 220 and 5.0 for 440) and press the [SHIFT] key.
LOCK [*]	Press to jump to the calling channel (Memory channel 1) Pressed after the [F] key to lock/unlock the keyboard.
BATT [0]	Pressed after the [F] key to display the battery voltage level.
BEEP [#]	Press to activate the Priority scan mode. Allows you to operate in the dial mode while the system automatically checks the last selected memory channel for activity. Pressed after the [F] key to deactivate the beep tone. See the [BEEP] key.
DUP [V/U]	Press to alternate the VHF & UHF frequency display. Pressed after the [F] key to activate the duplex mode. This allows you to monitor one band (ie. 2 meters) and transmit on the other. Set the desired frequencies using the [V/U] key and then press the [DUP] key.
STEP [D]	Pressed after the [F] key to change the frequency step for the PMS scan mode. Enter a scan step number (0-9) and then press the [STEP] key. The review the step, press the [D] key and then the [STEP] key. NOTE: There is a button located in the battery mounting track that controls the normal scanning step.

STORE A FREQUENCY IN MEMORY

STEP [D] + Enter Frequency + STEP [D] + Select optional offset and tone + Enter Memory Channel # (0-9) + TX M [M]

STORE AN ODD-SPLIT REPEATER

STEP [D] + Enter Frequency + STEP [D] + Select optional offset and tone + Enter Memory Channel # (0-4) + TX M [M]

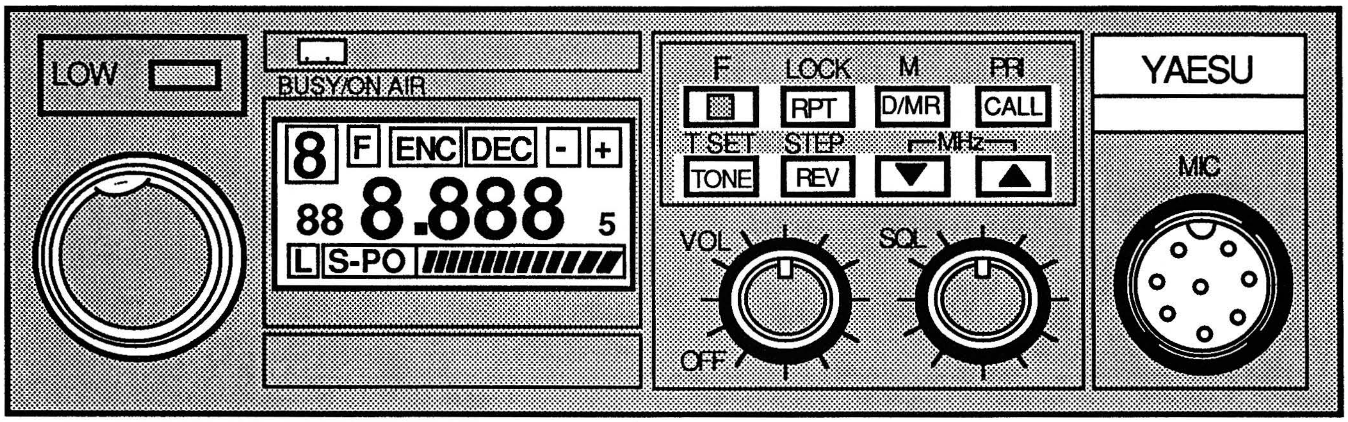
→ Enter Transmit Frequency + STEP [D] + Enter Memory Channel # (0-4) + [F] + TX M [M]

Specifications

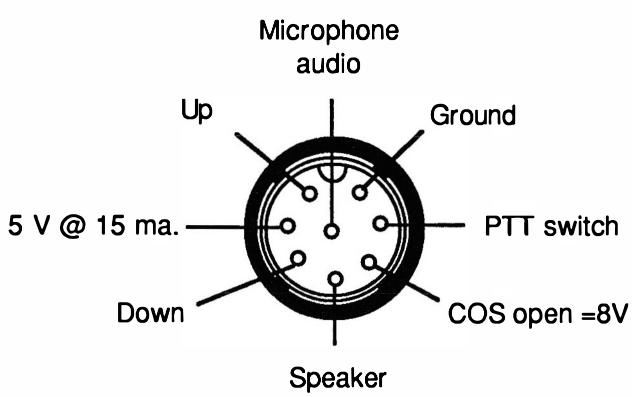
Frequency Range	144 - 148 440-450 MHz
Channel Steps	5/10 KHz 12.5/25 KHz
Power VHF Rec./ Trans.	50ma. / 1.3 Amp.
Power UHF Rec./ Trans.	50ma. / 1.35 Amp

YAESU FT-XX11

FT-???, FT-???, FT-2311

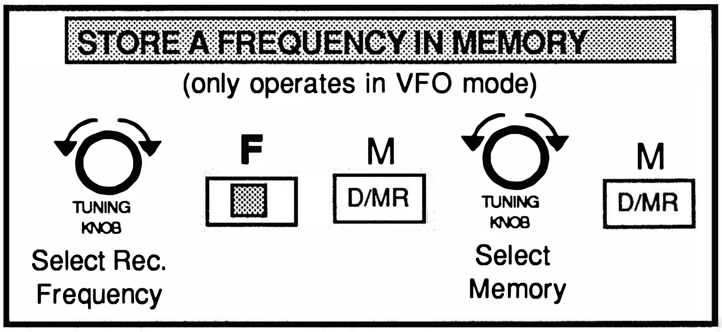


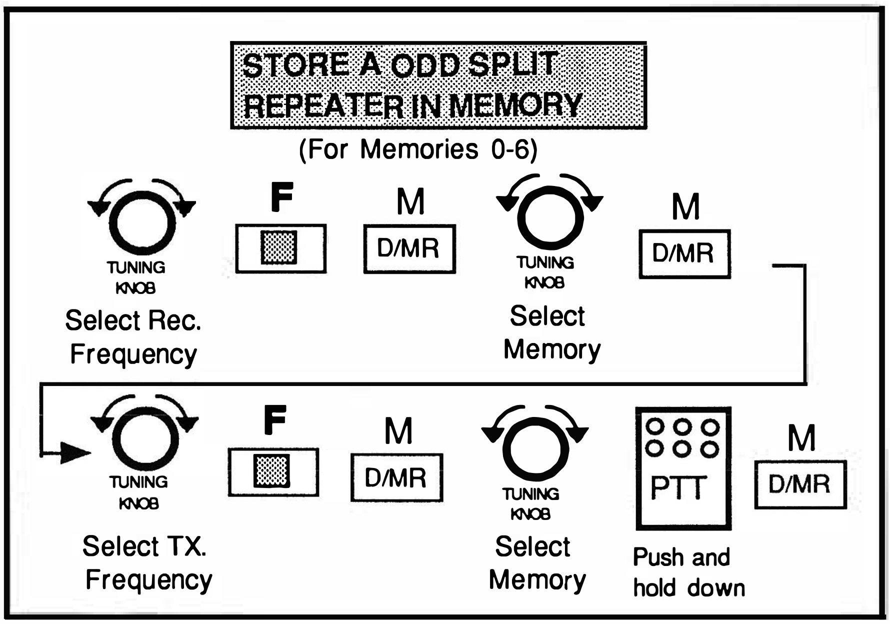
YAESU FT-xX11



Key	Commands
PRI / CALL	Press to activate the call channel scan(Memory channel 0). Pressed after the [F] key activates the priority channel scan (Memory channel 1). Select the memory channel you wish to monitor and the press the [PRI] key. To cancel press the [D/MR] key.
M / D/MR	Press to switch between the VFO and Memory modes. In the Memory mode, the channel number will appear in the upper left of the display. Pressed after the [F] key to store the VFO frequency information into a memory channel. After pressing the [M] key you must select a memory channel using the Dial selector and the press the [M] key again to complete the store a memory operation.
LOCK / REP	Press to select the desired repeater offset direction. Options are simplex, + (up) and - (down). The + or - simbol will appear on the display to indicate the direction. No + or - indicated simplex operation, both the + and - indicate an odd-split. Only Memories 0-6 can store an odd split. Pressed after the [F] key to lock and unlock the keyboard. In the Lock mode, a "L" will appear in the bottom left of the display. In the LOck mode the Dial Knob is not locked!
F / ▒	This is the Function key. This key must be pressed and released to select any of the keyboard commands imprinted above the other keys. When the [F] key is pressed, a "F" symbol will appear in the display. You must press another key within 4 seconds.
▲ / MHz	Press to increment the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to increment the operating frequency by one megahertz.
MHz / ▼	Press to decrement the operating Frequency/Memory. Hold Down for 1 second to start the scan mode. Pressed after the [F] key to decrement the operating frequency by one megahertz.
STEP / REV	Press to reverse the Transmit/Receive Frequencies while in the [SHIFT]/Repeater mode. The display will flash the + or - symbol while in this mode. Operates in VFO and Memory modes. Pressed after the [F] key to change the frequency step. The step is the amount of frequency change that occurs when you turn the dial selector.
T SET / T	Pressed in Memory and VFO mode, this key will cause the transmitted signal to be encoded with a PL subaudible tone. (The optional FTS-12 is required) Press the [T] key again to activate the decode (CTCSS)mode. When in the decode mode, the incoming signal must have the proper PL tone to be received. Pressed after the [F] key to change the subaudible (PL) tone. Use the Dial selector to change to the desired PL tone. Press the [T SET] again to exit the mode. Changes to a memory channel will not be retained after the VFO or another memory channel is selected.

YAESU FT-XX11

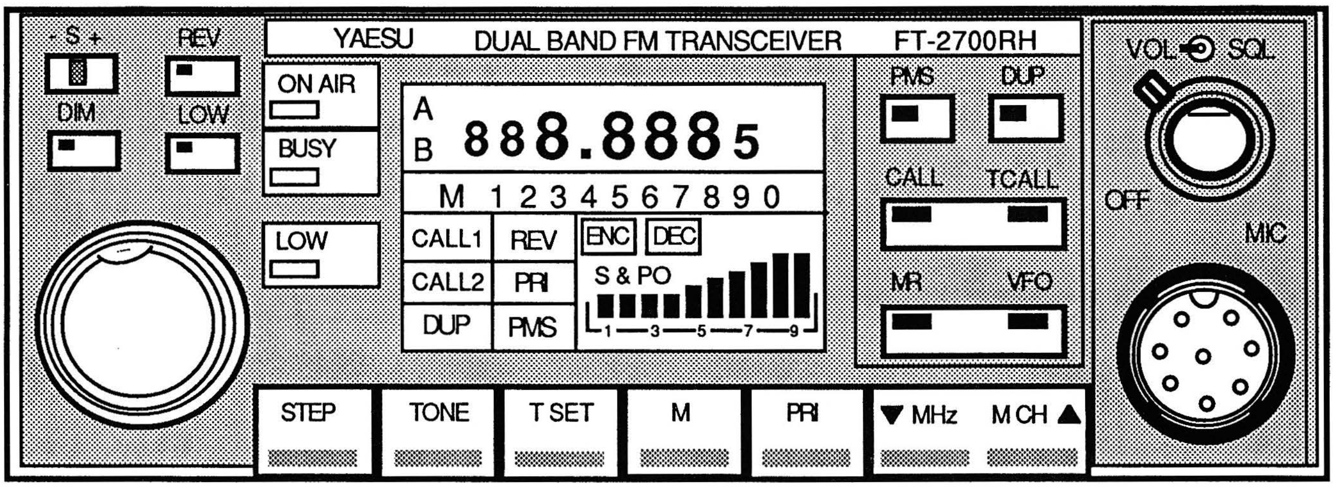


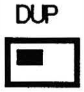
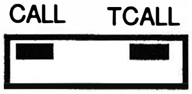


SPECIFICATIONS

	FT-X11	FT-X11	FT-X11	FT-2311
Freq. Range in MHz	144-148	220-225	440-450	1260-1300
Current drain TX/RX	9.5 / .4	6.5/ .4	8.5/ .4	5.5/ 2.5
Output Power in Watts	5 / 45	5 / 25	5 / 35	1/ 10
Sensitivity	< .25 uv.	< .25 uv.	< .25 uv.	< .25 uv.
Audio Output Watts @ 8 Ohms	1.5	1.5	1.5	1.5
Size W/H/D in Millimeters	160/50/175	160/50/175	160/50/175	160/50/175

YAESU FT-2700RH

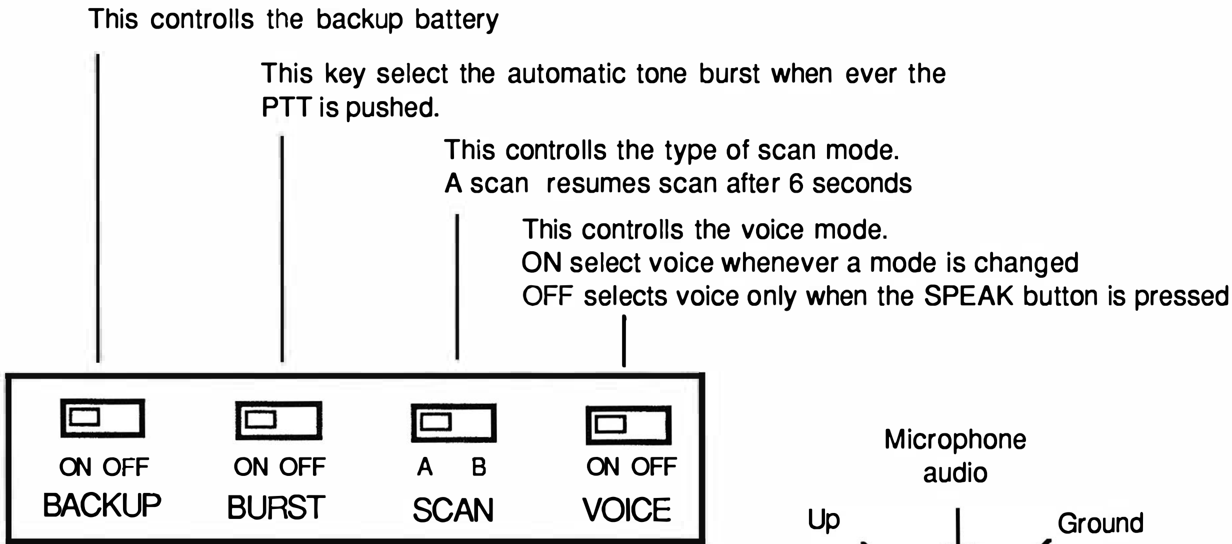


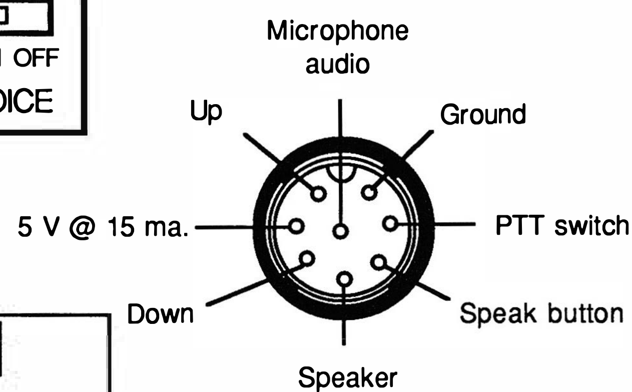
Key	Commands
VOL SQL 	Power, Volume and squelch are all provided on this control. Volume and power are controlled from the middle knob. Squelch is controlled by the outer knob.
PMS 	This key will activate the Programmable memory scan mode. Store the lowest frequency in memory 9, store the highest frequency in memory 0. Press the [PRS] button and then the up or down buttons on the microphone to start the scan.
DUP 	This key will activate the duplex (cross band) mode. VFO A and B are used. This will allow you the simultaneously receive on one band and transmit on the other.
CALL TCALL 	This button is used to activate the extra memory storage channel called CALL1. To store a frequency into the CALL1 memory, dial the desired frequency. press the [M] button and then the left hand side of the [CALL TCALL] button. The select the CALL1 memory, simply press the left hand side in any mode. Press and holding the [PRI] button to activate the fixed CALL2 memory. Pressing the right hand side will force a tone busrt to be transmitted.
MR VFO 	Switch between VFO and Memory modes. In the Memory mode, the Memory channel indicator will turn on. Two VFO's are available VFO A and VFO B. Press the right side of the button the alternate VFOs.

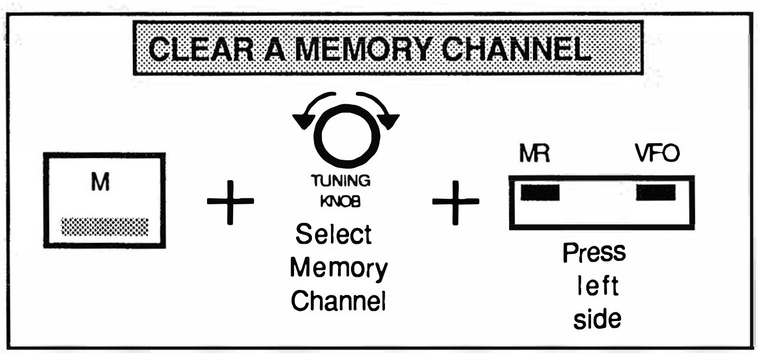
FT-2700RH

Key	Commands
▼ MHz M CH ▲	In VFO mode, this button will change the frequency by Megahertz. Press the left side to move down or the right side to move up. In Memory mode the the left hand button will move down to the previous memory channel, pressing the right side will move the display up to the next memory channel.
STEP	Press this button the adjust the channel stepping. In VHF step are 5 or 10 kHz. In UHF step are 12.5 kHz or 25 kHz
TONE	In Memory and VFO mode, this key will cause the Transmitted signal to be encoded with a PL subaudable tone. Many repeaters require a PL tone to activate the repeater. This tone can also be used with another radio that has the CTCSS feature. Pressed again to activate the CTCSS feature. CTCSS will place the radio in a mode that will require the incomming signal to be encoded with the proper PL subaudable tone. Note: not all repeater encode a PL tone.
T SET	Pressed to change the subaudable (PL) tone. (Optional FTS-8 is required.) Use the Dial selector to change to the desired PL tone. Press the [T SET] again to exit the mode. Changes to a memory channel will not be retained after the VFO or another memory channel is selected.
M	In VFO mode it stores the VFO frequency into a memory channel. Tune the desired Frequency. Press the [M] Key and release, select the desired Memory channel and then press the [M] Key again. All this must be done within 6 seconds. Memories 1-8 are used to store "ODD SPLIT" repeater offsets. Dial the desired Receive frequency and press the [M] key. Select the memory number and press [M] again. Dial the desired Transmit Frequency and press the [M] key, hold the PTT switch and press [M] again. Note: the [-S+] and [REV] keys will be disabled.
PRI	This button is used to activate the Prioroty memory mode. Select the desired memory channel and then press the [PRI] button. Now you may monitor any frequency in the VFO mode. Every 6 seconds the Priority memory channel will be checked for activity. When activity is detected. the memory will be displayed.
- S +	In VFO and MEMORY modes, the transmitter offset will be changed from minus (-) to Simplex to a positive (+) offset.
DIM	This key will dim the display light.
LOW	This key is used to select the desired transmitter output power level. See Power level chart. The Signal/RF indicator will display the selected power level when the PTT switch is pressed.. High power will show all bars lighted. Low power will light 3-4 bars.
REV	This key switches the Receive frequency and the Transmit frequency,

FT-2700RH



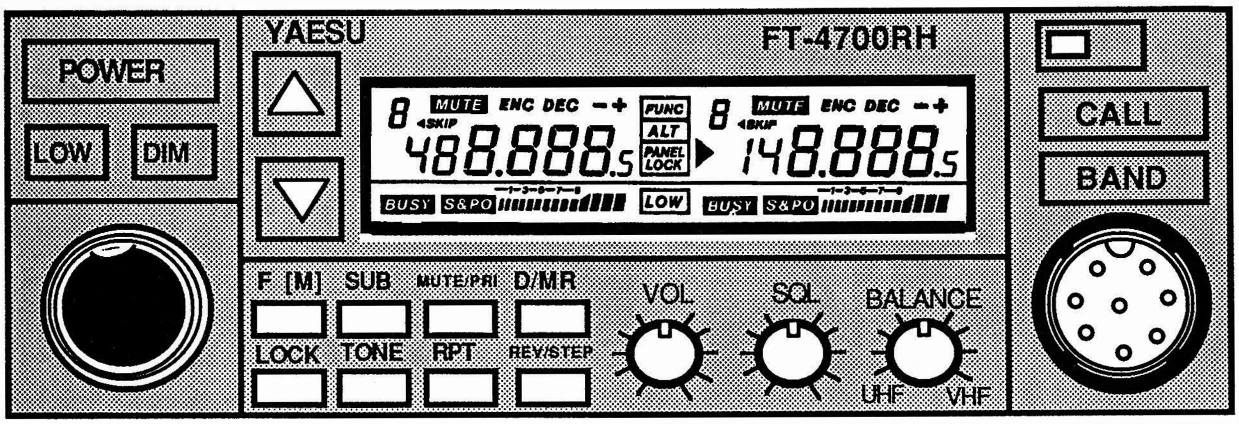


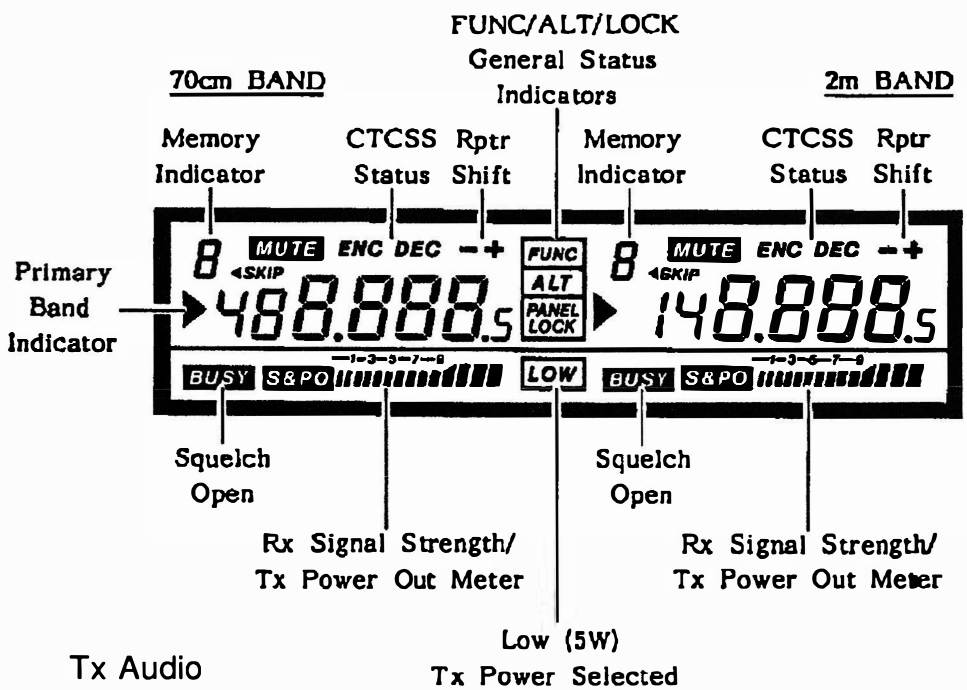


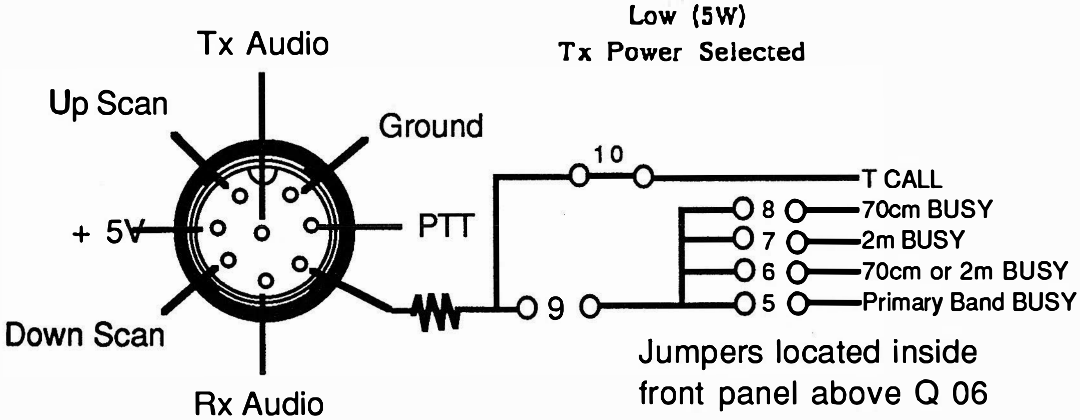
	FT-2700
Frequency Range VHF UHF	144 - 148 MHz 440 - 450 MHz
Current Drain Squelched TX 3 watts TX 25 watts	 600mA 3 Amps 7 Amps
Sensitivity	.20 uv
Audio Output Power	2 Watts

Notes

YAESU FT-4700RH







Jumpers located inside
front panel above Q 06

YEASU FT-4700

Desired Function	Dial/Memory	Keystrokes
Beeper On/Off	D/M	F [M] + DIM
CALL Channel Recall	D/M	CALL
Channel Step Selection	D	F [M] + REV/STEP + Dial
Hide a Memory	M	F [M] + REV/STEP
Unhide a Memory	M	F [M] + Dial + REV/STEP
Lock/Unlock Keyboard	D/M	LOCK
Memory Recall	D	D/MR + Dial
Memory Tune	M	▲ ▼ + Dial
Memory Storage	D	F [M] HOLD UNTIL CH # BLINKS + Dial SELECT MEMORY + F [M]
Memory Storage of Transmit Freq.	D	F [M] HOLD UNTIL CH # BLINKS + Dial SELECT MEMORY + PTT Push & Hold + F [M]
Mute Second Band	D/M	MUTE/PRI
Skip/Unskip a Memory	M	F [M] + REV/STEP / F [M] + Dial SELECT MEMORY + REV/STEP
Set PL/CTCSS Tone	D/M	F [M] + TONE + Dial + TONE
Priority Mon (VFO)	D	D/MR + Dial + D/MR + F [M] + MUTE/PRI
Priority Mon (Memory)	M	F [M] + MUTE/PRI

F [M] Press and hold for at least 1/2 second until [FUNC] appears on display

YEASU FT-4700

Key	Standard Function	Alternate Function
F [M]	Shift other keys to alternate functions	Cancel alternate functions
SUB	Toggle Secondary Band	Allow Tuning and Change of Settings on Secondary Band
MUTE/PRI	Toggle automatic muting	Activate Priority Monitoring
D/MR	Toggle VFO/Memory mode	Scan Skip (in memory mode)
LOCK	Toggle keyboard lock	none
TONE	Toggle Tone Squelch ENCODE/DECODE/OFF	Select PL tone
RPT	Select Repeater Shift UP/DOWN/SIMPLEX	Toggle Repeater Offset
REV/STEP	Switch RX & TX Frequencies during [RPT] operation	Toggle Step Selecting
CALL	Jump to CALL Channel	none
BAND	Swap Primary and Secondary band	Enable Alternate Band Scan
△ ▽	Step up or down 1 MHz	Step up or down 1 MHz
LOW	Toggle High/Low TX power	same
DIM	Toggle Display Brightness	Toggle Scan Stop Beep

	Amps Low/High	Power High/Low	Audio Output	Sensitivity
VHF	3 / 10	50 / 5	1.5 W	>.1uV
UHF	3 / 10	40 / 5	1.5 W	>.1uV

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	TH-41A	IC-2SAT	FT-109	BC-590
	TH-45A	IC-2SRA	FT-209	BC-760
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	TH-215	IC-3A	FT-212	
	TH-315	IC-3SAT	FT-227R	
	TH-415	IC-04AT	FT-290	
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	TM-521	IC-12GAT	FT-727	
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	TM-631	IC-37A	FT-2311	
	TM-721	IC-47A	FT-2700	
	TM-731	IC-900	FT-4700	
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